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TAKAHASHI (W. N.) & RAWLINS (T. E.). **Rod-shaped particles in Tobacco mosaic virus demonstrated by stream double refraction.**—*Science*, N.S., lxxvii, 1984, pp. 26–27, 2 diags., 1933.

Further details are given of the technique of the methods used by the writers in the demonstration by means of stream double refraction [*R.A.M.*, xii, p. 234] that the particles in the tobacco mosaic virus are rod-shaped.

CLAYTON (E. E.). **Relation of the toxin produced by Bacterium tabacum to the pathogenicity and host range of this organism.** —Abs. in *Phytopath.*, xxiii, 1, p. 6, 1933.

The typical wildfire symptoms on tobacco leaves in the United States are stated to be due to the destruction of chlorophyll by a powerful exotoxin secreted by *Bacterium tabacum*. This substance is thermostable; not precipitated by mercuric chloride, neutral calcium acetate, or neutral lead acetate; not removable from solution by charcoal; able to pass through Berkefeld, collodium, and cellulose filters; resistant to acids but rapidly inactivated by dilute sodium or potassium hydroxide. Leaf-prick inoculations with (a) toxin, (b) toxin and bacteria, and (c) bacteria gave from (a) and (b) typical wildfire symptoms on many species of plants, but from (c) consistent positive results were obtained only on *Nicotiana* spp. The toxin inoculations indicated that tobacco leaf tissues are no more susceptible to injury from this agency than tomato or egg-plant and decidedly less so than bean [*Phaseolus vulgaris*] or cucumber. The (b) inoculations showed that the bacteria persist for some time in the tissues of all the above-mentioned plants. On re-isolation they were inoculated into field tobacco and produced heavy infection with subsequent spread, while the other test crops developed occasional lesions without further extension.

NOLLA (J. A. B.). **The damping-off of Tobacco and its control in Puerto Rico.**—*Journ. Dept. Agric. Puerto Rico*, xvi, 3, pp. 285–324, 11 pl., 1932. [Received April, 1933.]

This is a much expanded version of the author's note on the damping-off of tobacco seedlings (*Pythium de Baryanum* and

*Phytophthora parasitica* var. *nicotianae*) in Porto Rico [*R.A.M.*, xii, p. 398], especially in the part dealing with experiments on the control of the disease. In addition to the information already noticed, it may be mentioned that under local conditions soil sterilization by steaming or with formaldehyde does not appear to be practicable. Mercury compounds were found to be injurious to the seedlings and ineffective against the pathogens. While in preliminary trials two applications of corona copper carbonate dust at the rate each of 4 gm. per sq. ft. were fairly effective, they gave disappointing results in the field, presumably owing to heavy rains and to overcrowding of the seedlings. Copper stearate at the same rate of application seemed to control *Pythium de Baryanum* but not *Phytophthora parasitica* var. *nicotianae*.

Clayton (E. E.) & Gaines (J. G.). **Downy mildew of Tobacco.**—*U.S. Dept. of Agric. Circ.* 263, 7 pp., 3 figs., 1933.

A popular account is given of the history, symptoms, life-cycle, and means of control of tobacco downy mildew or blue mould (*Peronospora hyoscyami*) in the United States [*R.A.M.*, xii, p. 146]. According to competent observers this disease, as manifested in 1932, shows all the destructive features that have long rendered it the most serious problem of Australian tobacco growers [ibid., xii, p. 201]. It was an important factor in a 350,000-acre decrease in the 1932 crop of flue-cured tobacco in North and South Carolina and parts of Georgia. Attempts to control it by spraying in the first two of these States are reported to have given unsatisfactory results, while in Maryland and Georgia some success was obtained.

Stover (W. G.) & Vermillion (M. T.). **Some experiments with a yellow mosaic of Tomato.**—Abs. in *Phytopath.*, xxiii, 1, p. 34, 1933.

Tomato leaves [? in Ohio] were affected by a virus disease in which the chlorotic areas are irregular in shape and of a much paler colour than those of ordinary mosaic. Inoculation experiments gave successful results on tomato, tobacco, pepper [*Capsicum annuum*], and *Solanum nigrum*, while the susceptibility of *S. dulcamara* is doubtful. Pepper suffered more severely from the yellow than from ordinary mosaic, the leaves and blossom buds falling off and many plants being killed. The yellow mosaic virus was inactivated at about 83° C., and that of ordinary mosaic at 90° in the writers' tests. 'Streak' develops when healthy tomato plants are double-inoculated from tomatoes with yellow mosaic and from potato plants [cf. *R.A.M.*, xii, pp. 48, 250].

Heuberger (J. W.) & Norton (J. B. S.). **Water loss in Tomato mosaic.**—Abs. in *Phytopath.*, xxiii, 1, p. 15, 1933.

Detached mosaic tomato leaves lost 62 per cent. of their weight by drying as compared with 39 per cent. for healthy ones. Tests showed that transpiration was much more rapid in diseased than in healthy foliage. Plants grown in a nutrient solution gave a higher transpiration rate per unit of dry weight and of leaf surface in cases of long infection by mosaic than in a normal state. A

sharp drop in transpiration coincided with the appearance of the first visible symptoms, followed by a gradual increase.

CHAMBERLAIN (E. E.). **Wilt diseases of Tomatoes due to Fusarium lycopersici and Verticillium albo-atrum.**—*New Zealand Journ. of Agric.*, xlvi, 1, pp. 38–45, 4 figs., 1933.

Considerable annual losses are sustained by New Zealand tomato growers through attacks by *Fusarium lycopersici* and *Verticillium albo-atrum* [*R.A.M.*, iv, p. 69]. The former disease, first recorded in New Zealand in 1906, is now prevalent throughout the country and is particularly troublesome in glasshouses; infections of up to 50 per cent. of the crop have been recorded both in the glasshouse and the field, though this figure is exceptional for outdoor crops. If the plants become infected before they come into bearing a total loss is sustained, otherwise damage may be slight. Fruit infection has not been observed, and there is no evidence to show that the organism is seed-borne. *Verticillium* wilt, first recorded in New Zealand in 1924, is less prevalent than *F. lycopersici*, but may cause serious damage either in the glasshouse or the field; in New Zealand the fungus has been reported only on tomatoes and potatoes. In 1932, 80 per cent. infection was reported in one garden at Gisborne, and *V. albo-atrum* sometimes causes fairly severe losses in the Nelson district. None of the tomato varieties grown in New Zealand has yet been tested for resistance to either wilt.

Brief recommendations are made for control through improved cultural practices and soil sterilization or disinfection.

HOLMES SMITH (E.). **Tomato mildew control.**—*Gard. Chron.*, xciii, 2404, pp. 46–47, 1 fig., 1933.

Small has shown that when the humidity of a glasshouse in England exceeds 70 per cent. and the temperature rises above 71·6° F., tomato mildew (*Cladosporium fulvum*) is almost sure to develop [*R.A.M.*, ix, p. 71]. Experiments have recently been conducted in Lancashire in the control of this disease by salicylanilide [ibid., xi, p. 679] with satisfactory results, four applications being found necessary for the complete destruction of the fungus. These were given on 30th May, 6th June, two to three weeks later, and again after a similar interval. The preparation was made up as follows: 1 oz. salicylanilide paste, 2½ oz. agral I, and 10 galls. water. The total consumption for the four applications at Blackpool amounted to roughly 1 gall. of spray per 20 to 25 plants or 8 oz. per plant, while at Hesketh Bank 1 gall. of spray was used per 18 plants or 9 oz. per plant. Both the salicylanilide paste (shirlan HB) and the sulphonated oil spreader (agral I) are now obtainable at most of the principal horticultural stores, the former costing 3*s.* 4*d.* to 4*s.* 4*d.* and the latter 1*s.* 8*d.* to 2*s.* 2*d.* per lb. The actual outlay on spraying may thus be estimated at about 6*d.* per 100 plants.

LIMING (O. N.). **Elm diseases in America.**—Abs. in *Phytopath.*, xxiii, 1, p. 21, 1933.

From 1930 to 1932, 1,045 out of 1,407 specimens of elm examined.

at Wooster, Ohio, on account of suspected Dutch elm disease [*Ceratostomella ulmi*] showed the presence of parasitic fungi, 146 giving a *Verticillium* and 336 (?) *Cephalosporium* [*R.A.M.*, xi, p. 213; xii, p. 125]. Trees affected by the former disease in one year appear to recover, at any rate temporarily, the next season, but those attacked by *Cephalosporium* deteriorate as time advances.

SIBILIA (C.). **La resistenza dell' 'Ulmus pumila' al 'Graphium ulmi'.** [The resistance of *Ulmus pumila* to *Graphium ulmi*.] —*Boll. R. Staz. Pat. Veg.*, N.S., xii, 4, pp. 360–364, 1 fig., 1932.

In view of the suggestion that owing to the alarming spread of the disease caused by *Graphium* [*Ceratostomella*] *ulmi* the elms at present grown in Italy should be replaced by *Ulmus pumila* [*R.A.M.*, xi, p. 810], the author in the summer of 1932 conducted a series of inoculation tests on one-year-old trees of this variety transplanted to an experimental garden near Rome; control inoculations with *C. ulmi* were made simultaneously on *U. campestris*, *U. americana*, and *Acer campestre*. Three months later, examination showed that whereas the inoculations on the last-named host had given negative results all the others had been successful. On *U. pumila* the wood showed the characteristic discoloration to a distance of 8·5 cm. from the point of inoculation, mycelium identical with that found in natural infections was present in the vessels, and *C. ulmi* was re-isolated 8 cm. away from the site of inoculation. Owing to the artificial conditions of the experiment this result is not considered as definitely establishing the susceptibility of *U. pumila* to the disease.

WELCH (D. S.). **Nectria canker of Basswood.**—Abs. in *Phytopath.*, xxiii, 1, p. 36, 1933.

Basswood (*Tilia americana*) trees in central New York are seriously affected by a canker associated with a species of *Nectria*, which involved 117 out of 258 trees on two half-acre plots selected at random. The lesions are sunken in the centre and surrounded by a varying number of concentric callus rolls according to the age of the infection. Positive results were obtained in 54 out of 64 inoculation experiments on lime trees with the *Nectria*, all seven controls remaining healthy, and the same organism was repeatedly recovered from such infections 18 to 24 months after inoculation. Stromata bearing conidia and perithecia are sparsely produced at the margins of cankers on living trees. The fungus develops in profusion on living trunks that have been cut and left in the woods, and on such trees perithecia containing viable spores may be found throughout the year. Similar diseases, hitherto apparently unreported, have been found on *Acer rubrum*, *A. spicatum*, *Fraxinus nigra*, *Populus grandidentata*, *Prunus serotina*, and *Rhus typhina*.

EHRLICH (J.). **Nectria coccinea on Beech.**—Abs. in *Phytopath.*, xxiii, 1, p. 10, 1933.

Field observations, experimental work, and histological studies on the widespread and destructive disease of beeches in the

Canadian Maritime Provinces due to *Nectria coccinea* following invasion by the beech scale, *Cryptococcus fagi* [*R.A.M.*, xi, p. 410], have shown that the fungus enters the minutely fissured periderm of trunk and branches where the insect has been feeding, thence spreading rapidly through bark, phloem, cambium, and peripheral sapwood. The infected tissues are killed and the water circulation interrupted. Both the fungus and the insect are disseminated by wind, the former during and after rain. *N. coccinea* has recently been found as far south as Maine, while the insect is reported from Massachusetts.

JACKSON (L. W. R.) & HARTLEY (C.). **Transmissibility of the brooming disease of Black Locust.**—*Phytopath.*, xxiii, 1, pp. 83–90, 2 figs., 1933.

Details are given of the writers' experiments in the transmission of the brooming disease of black locust (*Robinia pseud-acacia*) [*R.A.M.*, viii, p. 537] in the District of Columbia. Successful transmission was effected by grafting diseased stem scions on to healthy stocks in 7 out of 12 cases, four of which (including one in which the scion had died) showed definite brooming of the stock for a distance of up to 3 ft. before the end of the first summer (five months after grafting). The symptoms thus induced included twig proliferation and leaf dwarfing as observed in the field. In other cases transmission experiments failed despite the union and growth of the scion. The disease is considered to be of the peach yellows type and presumably caused by a virus. Attempts to transmit the brooming disease by budding gave negative results.

JACKSON (L. W. R.). **Effects of H-ion and aluminum-ion concentrations on conifer damping-off.**—Abs. in *Phytopath.*, xxiii, 1, p. 18, 1933.

*Pseudotsuga taxifolia* and *Pinus ponderosa* seedlings were grown and inoculated with *Pythium* and *Rhizoctonia* in liquid and quartz sand cultures at a hydrogen-ion range equivalent to $P_H$ 2·5 to 8·5. A nutrient solution, stable through a wide $P_H$ range in the presence of iron and aluminium, was obtained by using disodium glycerophosphate as a phosphate source. In both liquid and sand cultures without aluminium, damping-off percentages increased from 0 at $P_H$ 2·5 to a maximum near the neutral point. In sand cultures the addition of aluminium sulphate apparently caused a decrease of damping-off at $P_H$ 3·5 but not at 6·5 [*R.A.M.*, xii, p. 269]. The growth of several *Pythium* isolations from both acid and alkaline soils was inhibited below $P_H$ 3·5, while it increased from 4·5 to 6·5 and then declined almost to cessation at 8·5. *Rhizoctonia* gave an appreciable growth at $P_H$ 3·5.

BROWN (J. G.) & EVANS (M. M.). **Crown gall on a conifer.**—*Phytopath.*, xxiii, 1, pp. 97–101, 2 figs., 1933.

The roots of a *Cupressus arizonica* tree at the Arizona University, Tucson, were recently observed to bear galls up to 9 in. in diameter resembling those caused by *Phytomonas* [*Bacterium*] *tumefaciens*, an organism apparently identical with which was

isolated on Patel's medium [*R.A.M.*, vi, p. 19] from the diseased material and inoculated with positive results into castor bean (*Ricinus communis*). Apart from a record by Miles and Brown (*Plant Disease Reporter Suppt.* 81, p. 133, 1931) of crown gall on *Juniperus sabina*, the present is believed to be the first report of the occurrence of the disease on a conifer.

LIESE (J.). **Die Douglasiennadelschütte und die Möglichkeit ihrer Bekämpfung.** [The leaf fall of Douglas Firs and the possibility of its control.]—*Mitt. Deutsch. Dendrol. Gesellsch., 1932*, xliv (*Jahrb.*), pp. 294–304, 2 pl., 1932.

The available information on leaf fall [*Rhabdocline pseudotsugae*] of Douglas firs [*Pseudotsuga taxifolia*] is summarized, with special reference to its effects on German silviculture and to the possibilities of its control [*R.A.M.*, xii, p. 255].

SOLOVIEFF (F. A.). Пузырчатая ржавчина Сосны (**Peridermium pini Wallr. var. corticola Rabh.**). (Фитопатологическое исследование). [Blister rust (*Peridermium pini* Wallr. var. *corticola* Rabh.) of the Pine. (Phytopathological investigation).]—*Mitt. der Forstl. Versuchsanst.*, Leningrad, vi, 1, pp. 3–44, 4 figs., 9 graphs, 1929. [German summary. Received March, 1933.]

The phytopathological survey in 1926 and 1927 of two extensive forestry estates (consisting mainly of *Pinus sylvestris*) in north-western Russia showed the considerable prevalence there of blister rust, presumably *Peridermium pini* var. *corticola*, since its transmission from pine to pine was established [*R.A.M.*, iv, p. 376; ix, p. 691]. The incidence of the rust was greatest (up to 26 per cent.) in the pure pine stands (of the Pinetum vacciniosum and P. cladinosum types), and least (5 per cent.) in the mixed pine and fir stands. In the first, infections occurred on trees of all ages between 43 and 143 years, but their maximum number was found on 60-year-old trees; initial infection had occurred only on wood between 15 and 63 years old. The maximum duration of the disease observed was 88 years in a 170-year-old tree, and 29 years in an 80-year-old stand. A single tree may bear as many as five distinct lesions, the average length of which is 1·5 m. with a maximum of up to 5 m. About 67 per cent. of the lesions observed were on the side of the tree facing south, indicating, in the author's opinion, marked phototropism in the fungus. The average annual rate of spread of the lesions was about 10 cm. up and down and 1·5 to 2 cm. laterally from the centre of attack. The largest number of trunks bearing lesions was in the dominant classes of the trees in a stand, while the largest number of trees killed by the rust was in the suppressed classes. The disease has, however, a very depressing effect on the growth of the affected trees, and the latter are gradually transferred from the dominant to the suppressed category. Particularly when the lesions are situated rather low down on the trunk, the trees are killed standing, the whole duration of the disease depending largely on the initial vigour of the individual tree and on the environmental conditions. The rust is further important in that, as shown by the data collected,

the annual increment in the volume of useful timber of the affected trees is only about two-fifths that of the healthy ones. The only control measure recommended is the felling and removal of diseased trees, and a schedule is worked out for the practical application of this measure in stands showing various degrees of intensity and severity of attack.

The effect of the disease on the technical properties of pine wood is discussed in some detail. It is pointed out that affected timber is very rich in resin, this considerably increasing its value as fuel, and rendering it very profitable for the distillation of tar.

MIELKE (J. L.) & HANSBROUGH (J. R.). **Susceptibility to blister rust of the two principal Ribes associates of Sugar Pine.**—*Journ. of Forestry*, xxxi, 1, pp. 29–33, 1933.

For three years (1930–2) the writers made observations on the susceptibility to white pine blister rust (*Cronartium ribicola*) of the two principal *Ribes* associates of sugar pine (*Pinus lambertiana*) in California, viz., *R. roezli* and *R. nevadense*, about 100 of each of which species were transferred to Owl Creek and D'Arcy, British Columbia, together with 75 of *R. sanguineum* and 69 of *R. lacustre* for comparison [*R.A.M.*, xii, p. 341]. Both *R. roezli* and *R. nevadense* proved to be highly susceptible to the rust, the former being defoliated before teleutospores could be produced in any numbers while the latter formed these organs in profusion. *R. sanguineum* was moderate both in susceptibility and teleutospore production, while *R. lacustre* is generally fairly resistant and forms relatively few teleutospores.

LINDGREN (R. M.) & CHAPMAN (A. D.). **Field inoculations of Pinus strobus with sporidia of Cronartium ribicola in Minnesota.**—*Phytopath.*, xxiii, 1, pp. 105–107, 1933.

In the summer of 1927 a number of field inoculations were made with sporidia of *Cronartium ribicola* on three- to seven-year-old *Pinus strobus* trees in two localities in Minnesota, the inoculum consisting of teleutosorus-bearing leaves of *Ribes nigrum* and *R. cynosbati* [cf. preceding abstract]. The methods were substantially the same as those of Snell and Gravatt [*R.A.M.*, v, p. 262], except that the 'iceless refrigerator' was replaced by wet sphagnum moss round the base of each pine, the entire plant being covered with a large can around which wet sacking and moss were placed. Under these conditions the temperature during incubation ranged from 57° to 76° F.

Of the nine trees inoculated with sporidia from *R. nigrum* at Rush Lake, eight showed definite symptoms of infection in November, 1929, while at Afton, where the inoculum originated on *R. cynosbati*, only one developed blister rust. Even allowing for the fact that conditions in the former locality were more favourable for infection, it seems reasonable to suppose that there is an actual difference in potency between the sporidia of the rust from the two currant hosts.

GILGUT (C. J.) & BOYD (O. C.). **Cytospora canker of Picea spp.**—Abs. in *Phytopath.*, xxiii, 1, p. 11, 1933.

Blue spruce (*Picea pungens* [var.] *glauca*) and to a lesser extent

Norway spruce (*P. excelsa*) have long suffered from a die-back of the lower limbs in Massachusetts. In 1923 a limb canker of unknown cause was reported on *P.* sp. from Connecticut. A species of *Cytospora* was found constantly associated with the cankers in Massachusetts in 1930, and was also recorded in the same year on *P. pungens* [var.] *kosteri* in New Jersey. From a quarter to half the limbs of blue spruce may be affected by the fungus, which generally starts on a lower limb and spreads upwards and laterally, producing extensive gummosis in most cases. Spring inoculations with pure cultures of the *Cytospora* from blue spruce resulted in typical limb cankers by the autumn, with pycnidial formation, gummosis, and death of limbs both on blue and Norway spruces. The organism was re-isolated in pure culture.

WATERMAN (ALMA M.) & MCKENZIE (M. A.). **A disease of Colorado Fir.**—*Phytopath.*, xxiii, 1, pp. 108–109, 1933.

About 500 Colorado fir (*Abies concolor*) trees in eastern Massachusetts were attacked in 1931 by *Rehmiellopsis bohemica*, previously reported by Bubák on *A. pectinata* in Czecho-Slovakia (*Naturw. Zeitschr. Forst. u. Landw.*, viii, p. 313, 1910) and subsequently found in Scotland [*R.A.M.*, vi, p. 446], where *A. nobilis*, *A. pinsapo*, *A. cephalonica*, and *A. pindrow* were also attacked. This is believed to be the first report of the fungus in the United States, and of *A. concolor* as a host.

The needles of the new growth turned reddish, then brown to black, and persisted for some time in a shrivelled condition on the twigs. By midsummer some of the diseased needles had been replaced by a stunted second growth but this was absent on other twigs which were blackened and malformed. The lower branches were most severely affected. The following year the new growth from the uninfected and relatively uninjured twigs soon developed yellow diseased areas, especially on the needles in proximity to those bearing perithecia from the previous season.

The morphological characters of the fungus are briefly described. No pycnidial stage such as reported in Europe has been definitely identified in the material collected.

Sections through the blackened twigs bearing diseased needles collected in the spring show abundant mycelium in the leaf cushions. The hyphae penetrate between the cell walls, their advance being preceded by a brownish discoloration and thickening of the latter, accompanied by distortion of the cells and excessive resin production.

GROSMANN (HELENE). **Über die systematischen Beziehungen der Gattung Leptographium Lagerberg et Melin zur Gattung Ceratostomella Sacc. nebst einigen Bemerkungen über Scopularia venusta Preuss und Hantzschia phycomyces Awd.** [On the systematic relations of the genus *Leptographium* Lagerberg & Melin to the genus *Ceratostomella* Sacc., with some observations on *Scopularia venusta* Preuss and *Hantzschia phycomyces* Awd.]—*Hedwigia*, lxxii, 6, pp. 183–194, 8 figs., 1932.

After recapitulating her account of the association of *Lepto-*

*graphium penicillatum* with bark beetles (*Ips typographus* and *Pityogenes chalcographus*) in spruce (*Picea excelsa*) wood in Switzerland [*R.A.M.*, x, p. 564], the writer states that the long-necked, black perithecia characteristic of *Ceratostomella* developed after four to six weeks in cultures on spruce bark and also on malt-meat extract-agar with tannin. The perithecia measured 850 $\mu$ in height and contained mucilaginous asci with eight hyaline, oval or slightly curved ascospores, 6·5 by 2·3 $\mu$, monospore cultures of which in their turn yielded the conidial stage of the fungus already described. The genetic connexion between the *Leptographium* and the *Ceratostomella* stages is thus established, the latter being named *C. penicillata* Grosmann, with a Latin diagnosis.

There is a possibility that *Scopularia venusta*, originally observed by Preuss in 1851 causing a blue discoloration of pine wood [cf. ibid., ix, p. 77], may be the same as *C. penicillata*, but the fungus has not been found since and its identity must remain doubtful though Preuss's figure in the main closely resembles the conidial stage of *C. penicillata*. *Hantzschia phycomyces* Awd., subsequently transferred by Saccardo to *Graphium* as *G. phycomyces*, is practically identical with *L. penicillatum* except for the shape and size of its conidia (oval, 3 to 4 $\mu$ in diameter), and is renamed *L. phycomyces* (Awd.) Grosmann.

KÜSTER (E.). **Hexenbesen an der Fichte.** [Witches' brooms on the Spruce.]—*Mitt. Deutsch. Dendrol. Gesellsch., 1932*, xliv (*Jahrb.*), pp. 305–306, 1 pl., 1932.

A description is given of a witches' broom observed on a spruce (*Picea excelsa*) tree 20 m. in height near Giessen, Germany. The 13-year-old structure measured 140 cm. in width at the base and 120 cm. in height, its shape being approximately spherical. The colour and anatomy of the needles in the witches' broom were normal but they were markedly shortened. The growth of the branches was compressed and red wood formation was conspicuous. The leaf bases were prominently developed, imparting a roughness to the surface of the branch. The scaly leaves were largely retained by the branches constituting the broom. Cones were formed only on the branches in the interior of the broom; the scales of which they consisted were small, rhomboid, and irregularly bent. Bud mutation is believed to be responsible for the development of witches' brooms of this type, which are stated to be prevalent in the Lahn Valley.

KAUFERT (F. H.). **Fire and decay injury in the southern bottomland hardwoods.**—*Journ. of Forestry*, xxxi, 1, pp. 64–67, 1933.

The writer has made a study of decay by wood-rotting fungi among the fire-scarred bottomland hardwoods in Louisiana. It was found that a high proportion (estimated at 90 to 95 per cent.) of the mature trees had been severely damaged by rots gaining entrance through fire wounds, while immature timber had apparently been even more extensively injured. Thus, in a 70-year-old oak stand of 261 trees examined in 1931, 47 per cent. had been

fire-scarred within the last 20 years and all showed some decay, extending on the average 4 to 6 ft. up the trunk; the merchantable product was reduced by some 14 per cent. in volume. In a tract of virgin red gum [*Liquidambar styraciflua*] a 12 per cent. loss was recorded. About 70 per cent. of young hardwoods injured by fire in 1924–5 showed considerable decay in 1931. Fire scars heal very slowly and have been found still open 15 to 20 years after formation.

PILÁT (A.). **Eine interessante Pilzinfektion des Weinberger Tunnels in Prag.** [An interesting fungus infection of the Weinberg tunnel in Prague.]—*Ann. Mycol.*, xxxi, 1–2, pp. 59–72, 1933.

Attention is drawn to the occurrence in the Weinberg tunnel leading out of the Wilson station in Prague, of the fungus *Leptoporus undatus* (Pers.) Pilát n. comb. (syn. *Polyporus undatus*, *Poria undata* [*R.A.M.*, v, p. 588], *L. broomei*, etc.), the very variable fruit bodies of which (described under various forms) are scattered in hundreds over the arch and walls. The growth in places covered more than two sq. m. of surface and protruded from between the stones constituting the tunnel lining, its connexion with wood being often not obvious. It is believed to have originated mostly from the remains of the props left behind the walls when the tunnel was constructed 60 years ago. The fungus, which has also been found in Czecho-Slovakian mines, is believed to have been present in the tunnel in a latent form until the recent electrification of the railway, its development being checked by the disinfectant action of the smoke from the steam trains, while a heavy coating of soot excluded air from the cracks in the structure. The present conditions evidently favour the development of *L. undatus*, which is further promoted by the extreme humidity of the atmosphere. The rot of the medullary rays induced by this organism is of the honeycomb type; the wood turns reddish-brown and is eventually converted into a pulpy mass. The hyphae of the fungus were found to penetrate the most minute interstices of the structure, destroying the mortar both by mechanical and chemical means, the latter involving the destruction of the lime by its conversion into calcium oxalate crystals. The writer does not anticipate extensive damage to the tunnel from the invasion of *L. undatus*, the removal of which would in any case be impossible while its present substratum lasts. The advantages of disinfection are very problematical owing to the great resistance of the hyphae to toxic agents, and the substitution of some inorganic material for wood props in future constructions of the kind is recommended.

LINDGREN (R. M.). **Decay of wood and growth of some Hymenomycetes as affected by temperature.**—*Phytopath.*, xxiii, 1, pp. 73–81, 2 graphs, 1933.

The effect of temperature on the rate of wood decay and of mycelial growth on culture media was studied at Minnesota University under controlled conditions with three wood-destroying

fungi, viz., *Lenzites sepiaria*, *Polystictus versicolor*, and *Lentinus tigrinus*. The cardinal temperatures for growth on malt extract agar were found to be as follows: *L. tigrinus*, minimum, optimum, and maximum 7°, 32° to 35°, and 43° C., respectively; *P. versicolor*, 0°, 27° to 32°, and 40°; *Lenzites sepiaria*, 5°, 32° to 35°, and 45° [cf. *R.A.M.*, x, p. 572].

Blocks of *Pinus resinosa*, *Picea glauca*, *Betula papyrifera*, and *Populus tremuloides* wood (112 in all) were autoclaved for 30 minutes at 15 lb. pressure, a block of each species being then transferred to jars containing pure cultures of each fungus which were placed in incubators maintained at constant temperatures of 22°, 27°, 32°, and 35°. The decay caused by *L. sepiaria* and *P. versicolor* progressed most rapidly at the temperatures favouring their mycelial growth, while the rot due to *Lentinus tigrinus* was most active at 27°. Both mycelial growth and decay processes were substantially retarded for all three organisms at 22°.

The temperature relations of wood-destroying fungi are generally studied only in culture, on the assumption that their behaviour in nature can be predicted on this basis. For all practical purposes this supposition is probably correct, but it is conceivable that the chemical and physical differences between the natural and artificial substrata may induce corresponding alterations in the fungi concerned. Another difficulty in predicting the rate of wood decay at various temperatures from agar tests lies in the time factor, the culture experiments covering relatively short periods while the rotting of wood requires protracted exposure. It is advisable, therefore, that tests on agar should be correlated with studies on the decay of the natural substrata of the wood-rotting fungi.

LINDGREN (R. M.), SCHEFFER (T. C.), & CHAPMAN (A. D.). **Tests of chemical treatments for control of sap stain and mold in southern lumber.**—*Indus. & Engin. Chem.*, xxv, 1, pp. 72–75, 1933.

A fully tabulated account is given of the writers' experiments in Louisiana with about 100 chemical treatments for the control of sap stain (*Ceratostomella* spp.) and mould in pine [*Pinus palustris*] and hardwoods, e.g., sap gum [*Liquidambar styraciflua*], the essential features of which have been already noticed from another source [*R.A.M.*, xii, p. 344].

ROUTALA (O.) & KUULA (O.). **Eine neue Holzimprägnierungsmethode.** [A new method of wood preservation.]—*Acta Chem. Fenn.*, v, pp. 107–112, 1932. [Abs. in *Chem. Zentralbl.*, civ, 7, p. 1221, 1933.]

At the Helsingfors (Finland) Technical Institute wood was impregnated with furfural or formaldehyde and phenol and then heated under pressure with ammonia gas for one to two hours. Resin-like condensation products developed in the wood and prevented the entrance of water, the penetration of which during two hours was reduced from 34·4 to 0·8 per cent. Thus, the requirements of fungi and bacteria as regards water supply are not fulfilled by the treated wood.

GIBBS (J. G.). **Club-root of Brassicas. Experiments on disinfection of seed-beds.**—*New Zealand Journ. of Sci. & Techn.*, xiv, 3, pp. 145–151, 1932.

Of 89 treatments applied to the soil of swede seed-beds at Palmerston North, New Zealand, for the control of finger-and-toe (*Plasmodiophora brassicae*) [*R.A.M.*, xi, p. 555], only seven gave satisfactory control of the disease without adversely affecting plant growth, viz., slaked lime (30 or 60 cwt. per acre), acidulated mercuric chloride (0·1 and 0·2 per cent. containing 0·25 and 0·5 per cent. hydrochloric acid, respectively [ibid., xi, p. 260]), 0·1 per cent. mercuric chloride, and semesan (0·5 per cent. solution or as a dust at the rate of 5 oz. per sq. yd.). The cost of the treatments ranged from under one penny per sq. yd. for 45 cwt. of lime per acre (1 lb. per sq. yd.) to 1*s.* 4·8*d.* per sq. yd. for 2 galls. of 0·5 per cent. semesan per sq. yd. The acidulated mercuric chloride treatment, which is recommended by the writer for practical use, costs 2·6*d.* per sq. yd.

BROWN (J. G.) & EVANS (M. M.). **Diseases of Peas in Arizona.**—*Arizona Agric. Exper. Stat. Bull.* 142, 78 pp., 17 figs., 1933.

Popular notes are given on the symptoms, cause, and control of the following diseases of peas in Arizona: powdery mildew (*Erysiphe polygoni*) [*R.A.M.*, xi, p. 28], downy mildew (*Peronospora viciae*) [ibid., xi, p. 75], a *Fusarium* foot rot believed to be due to a variety of *F. merismoides* [ibid., xii, p. 263], *Rhizoctonia* [*Corticium*] *solani*, Texas root rot (*Phymatotrichum omnivorum*), bacterial blight (*Phytomonas* [*Pseudomonas*] *pisi*) [loc. cit.], and the injuries caused by drought, soil alkalinity, and hail. The paper concludes with a summary in which the main facts relating to each disease are conveniently tabulated, and there is a bibliography of 18 titles.

WALKER (J. C.). **Comparative studies of Peas resistant and susceptible to Fusarium wilt.**—Abs. in *Phytopath.*, xxiii, 1, p. 36, 1933.

Alaska pea plants of strains resistant and susceptible to the causal organism of wilt, *Fusarium orthoceras* var. *pisi* [*R.A.M.*, xii, p. 71], were grown for varying periods at about 15° C. in Tottingham's solution, to which 1 per cent. dextrose was added on the removal of the plants. The fungus was then grown on aliquot portions of the autoclaved solution. A consistently heavier growth was observed in the solution in which the susceptible roots had grown. In autoclaved extracts from fresh susceptible roots there was a slightly heavier growth than in those from resistant ones, and a similar slight difference was detected in extracts from air-dried roots. In extracts from roots dried at 85° C. there was a markedly heavier growth in those from susceptible ones.

HEIMBECK (LOUISE S.). **Seed-borne bacteria main cause of Pea wilt; Fusarium, Aphanomyces, and other organisms merely subsidiary.**—Abs. in *Phytopath.*, xxiii, 1, p. 14, 1933.

Pea wilt is stated to be best studied on peas grown in water

cultures, in which fatty substances oxidize slowly, so that the cell walls of the roots are easily penetrated by the bacteria, which gain access to the vascular core chiefly through endodermal openings formed by secondary rootlets. The host cells react to invasion by the production of a yellowish-brown to reddish, gummy substance that conceals the bacteria except in stained microtome sections. The bacteria may reach the growing pod and enter the ovule, without, however, preventing its development into a viable seed. Seedlings originating from infected seed show vascular discolorations in the cotyledon petioles, epicotyl, or root, but under favourable growing conditions and in the absence of such secondary parasites as *Aphanomyces* [*euteiches*: see next abstract] or *Fusarium* [see preceding abstracts] they may grow into apparently healthy plants.

WALKER (J. C.). **Relation of soil fertility to incidence of Aphanomyces root rot of Pea.**—Abs. in *Phytopath.*, xxiii, 1, p. 36, 1933.

Colby silt loam is stated to be one of the most favourable Wisconsin soils for the development of the pea root rot due to *Aphanomyces* [*euteiches*: *R.A.M.*, xi, p. 626]. All the eight canning varieties tested in the greenhouse on this type of soil from a heavily infested field were severely damaged by the disease, which underwent a marked decline on the addition to a portion of the soil of a 500 lb. application of 4–16–4 fertilizer. In the Alaska variety the incidence of infection was reduced from between 63 and 100 per cent. on the unfertilized to between 3 and 20 per cent. on the fertilized soil, while similar reactions were displayed by the Surprise, Bruce, Admiral, Ashford, Perfection, Prince of Wales, and Wisconsin Early Sweet varieties.

SAVASTANO (G.). **Il mosaico del Fagiolo in Italia.** [Bean mosaic in Italy.]—*Boll. R. Staz. Pat. Veg.*, N.S., xii, 4, pp. 377–394, 4 pl., 3 figs., 1932.

In this account of the geographical distribution, symptoms, probable nature of the virus, and different types of bean mosaic [*R.A.M.*, vii, pp. 108, 134; xii, p. 204] the author states that beans [*Phaseolus vulgaris*] of numerous varieties growing near Rome were recently affected. Rubbing healthy leaves with diseased tissues in a few instances caused incipient pock marking, and three out of thirty seedlings raised from seed obtained from affected plants, the seedlings being protected from insect infestation, developed definite mosaic [ibid., vii, p. 658]. Early in the autumn many of the originally affected beans showed only faint traces of mosaic, the masking being due to the seasonal drop in the temperature [ibid., ix, p. 755]. Reference is made to the discovery of resistant varieties in America and Germany [ibid., ix, p. 561] and it is stated that Robust seed obtained from Michigan is to be tested for suitability to Italian conditions. The paper concludes with brief recommendations for control, and there is a bibliography of 18 titles.

ZAUMEYER (W. J.). **Transmission of Bean-mosaic virus by insects.**—Abs. in *Phytopath.*, xxiii, 1, p. 40, 1933.

Insect population studies in the bean [*Phaseolus vulgaris*] fields of Colorado, Idaho, and Virginia have shown that, of the many species present, aphids alone are capable of mosaic transmission [see preceding and next abstracts]. Under controlled greenhouse conditions, the virus has been transmitted by feeding virus-free aphids on diseased beans for 24 to 30 hours and then transferring them to healthy plants. Besides the potato aphid (*Illinoia solanifolii*) [*Macrosiphum gei*], the bean aphid (*Aphis rumicis*), and the peach aphid (*Myzus persicae*), already known as vectors [*R.A.M.*, ix, p. 756], the following will also transmit the virus: the pea aphid (*I.* [*Macrosiphum*] *pisi*), the cucumber aphid (*A. gossypii*), the cabbage aphid (*Brevicoryne brassicae*), the *Chenopodium* aphid (*Hyalopterus atriplicis*), and an aphid, *M. ambrosia*, common on wild Compositae. All except the last-named have been found on beans in the field.

ZAUMEYER (W. J.). **Transmission of certain legume-mosaic viruses to Bean.**—Abs. in *Phytopath.*, xxiii, 1, p. 39, 1933.

Cross-inoculation experiments have shown that the viruses causing mosaic of white and yellow sweet clover (*Melilotus alba* and *M. officinalis*), and white and alsike clover (*Trifolium repens* and *T. hybridum*) are transmissible to beans [*Phaseolus vulgaris*]. The *M. alba* mosaic virus produced symptoms on beans differing only slightly from those of the common bean mosaic [see preceding abstracts], and it is thought possible that some of the secondary spread of the latter in the field may be due to aphid transmission of the white sweet clover virus. The pea and sweet pea (*Lathyrus odoratus*) mosaic viruses [ibid., vi, p. 469; x, p. 78; xi, p. 759] also gave positive results on inoculation into beans, either by means of expressed juice from diseased plants or by the pea aphid, *Illinoia* [*Macrosiphum*] *pisi*.

NELSON (R. E.) & DOWN (E. E.). **Influence of pollen and ovule infection in seed transmission of Bean mosaic.**—Abs. in *Phytopath.*, xxiii, 1, p. 25, 1933.

To test the possibility of bean [*Phaseolus vulgaris*] pollen infection by mosaic [see preceding abstracts], and to determine the relative effects of pollen and ovule infection in seed transmission of the disease, crosses were made between the two highly susceptible Refugee and Early Prolific varieties. The incidence of mosaic in hybrids between diseased Refugee and healthy Early Prolific was about the same as in those between healthy Refugee and diseased Early Prolific. The data indicate that about a quarter of the ovules and pollen grains are infected. In crosses between Refugee and Robust, a highly resistant variety, about a quarter of the hybrid seedlings showed severe mosaic infection.

ADAM (D. B.). **Bacterial blight of Beans.**—*Journ. Dept. Agric. Victoria*, xxxi, 1, pp. 1–4, 3 figs., 1933.

After stating that French beans [*Phaseolus vulgaris*] in Victoria

became rather widely attacked two or three years ago by bacterial blight [*Bacterium phaseoli*: *R.A.M.*, x, p. 6; xi, p. 222; xii, p. 1], probably present locally in a mild form for some years, the author gives a brief account in popular terms of the manner of attack and symptoms of the disease.

Spread is favoured principally by wet, windy weather, and as this becomes less frequent as summer approaches the beans should, whenever possible, be planted later than has hitherto been customary in Victoria. The disease does not become established in areas watered only by irrigation. Losses can also be reduced by selecting for the early plantings sites sheltered from wet winds, keeping the more exposed fields for the later crops. Light sandy soil is more conducive to attack than flat river land. Sulphate of ammonia and similar fertilizers did not reduce blight in tests carried out in 1932.

Canadian Wonder beans are highly susceptible, but some of the 'fancy' varieties, such as Pale Dun and Feltham's Prolific, possess some degree of resistance.

To develop supplies of disease-free seed, a process which would practically eliminate the blight, the Victoria Department of Agriculture has established experimental plots in the heart of the seed-growing area at Orbost, while efforts are also being made to institute a seed certification scheme. Already many growers are taking every precaution at present available to secure clean crops.

Person (L. H.). **A bacterial blight of the Broad Bean in Louisiana.**—Abs. in *Phytopath.*, xxiii, 1, p. 27, 1933.

Broad beans [*Vicia faba*] were severely attacked in 1932 by a blight causing the development on the leaves of circular, dark-brown to black spots, 2 to 5 mm. in diameter, which usually coalesced and killed the affected foliage. A bacterium isolated from these spots produced a typical streak disease on inoculation into healthy stems, the streaks extending up to an inch from the point of inoculation, while leaves painted with a water suspension of the organism showed dark, circular areas resembling those observed in nature. Apparently this is the first record of a bacterial blight of broad beans in the United States, and it is not yet known whether it corresponds to that occurring in Europe [? *Bacillus lathyri*: *R.A.M.*, xi, pp. 143, 555].

Wingard (S. A.). **Nature of rust resistance in Beans.**—Abs. in *Phytopath.*, xxiii, 1, p. 38, 1933.

Bean [*Phaseolus vulgaris*] varieties may be grouped in three classes on the basis of their reaction to rust [*Uromyces appendiculatus*: *R.A.M.*, xi, p. 284], viz., (1) immune; (2) those showing severe flecking as a result of infection; and (3) those on which numerous sori are produced. The flecking varieties are hypersensitive, the tissues being killed immediately the fungus enters the leaf. In the third group there is some evidence of a preservative action towards the host on the part of the fungus, as shown by the persistence of the chlorophyll in the region surrounding the sorus after the death of the rest of the leaf.

Schmidt (E. W.). **Zwei seltene Rübenschädlinge.** [Two rare Beet pests.]—*Die Deutsche Zuckerind.*, lviii, 1, pp. 17–18, 6 figs., 1933.

From the Cordova district of Spain the writer received a decayed sugar beet from which he isolated the fungus *Typhula variabilis*, first studied by Prillieux in 1895 in diseased sugar beets, also from Spain, and in 1906 reported by Brizi from Cremona, Italy [cf. *R.A.M.*, viii, p. 597]. Inoculation experiments on greenhouse beets gave positive results, but the fungus has not been observed under field conditions in Germany where the soil is apparently not sufficiently warm to admit of its development. The organism causes complete rotting of the beets in a few weeks, forming thick, white strands of woven hyphae in the soil and round the root, while on the surface of the beet the sclerotia are produced and persist for months in the soil pending their development into mycelium. Clavate basidia with basidiospores have been obtained in culture.

Benlloch (M.). **La Cercospora de la Remolacha.** [The *Cercospora* of the Beet.]—*Bol. Pat. Veg. y Ent. Agric.*, vi (*1931*), 23–26, pp. 153–161, 10 figs., 1932.

An account is given of the leaf spot of beets (*Cercospora beticola*) in Spain, with notes on its control by three to seven applications of 2 per cent. Bordeaux or 1 per cent. Burgundy mixture with the addition of 60 gm. calcium caseinate per hectol. [*R.A.M.*, xii, p. 349].

Felix (E. L.). **Disease resistance in Allium fistulosum L.**—*Phytopath.*, xxiii, 1, pp. 109–110, 1933.

In experiments at Elba, New York, the incidence of smut (*Urocystis cepulae*) infection in the Winterhecke onion (*Allium fistulosum*) frequently averaged 10 to 20 per cent. in the cotyledonous stage, but always fell to 0·5 or less per cent. in later counts. This variety is synonymous with White Welsh (Ciboule blanche or Ciboule d'hiver) and very similar to a number of Japanese varieties showing a high degree of resistance [cf. *R.A.M.*, v, p. 205]. Another strain of *A. fistulosum*, known as *A. moly*, proved more susceptible to smut (45 per cent.). The Winterhecke, White Welsh, and Nebuka strains were also found to be resistant to pink root (*Phoma terrestris*) [ibid., xi, p. 162], while the first-named further appeared to suffer little damage from mildew (*Peronospora schleideni*) [ibid., xi, p. 689].

Nelson (R.) & Cochran (L. C.). **Breeding Fusarium yellows-resistant Celery.**—Abs. in *Phytopath.*, xxiii, 1, p. 25, 1933.

Commercial tall-strain celery varieties, e.g., Golden Self Blanching, have suffered increasingly in Michigan during the past five years from yellows (*Fusarium* sp.) [*R.A.M.*, viii, p. 22], the losses from which in 1931 amounted to $250,000. The short-strain varieties, such as Golden Plume, show a fair degree of resistance under normal conditions. The $F_1$ and $F_2$ progenies of a selection from a susceptible tall strain have shown marked resistance in field and greenhouse tests under the most favourable conditions for yellows. The plants of the new variety, known as Michigan

Golden, are intermediate in type between the tall and short strains and appear to possess desirable commercial qualities.

COOK (H. T.). **Infection of seed clusters of Spinach by Peronospora effusa.**—Abs. in *Phytopath.*, xxiii, 1, p. 7, 1933.

The seed clusters of spinach seed plants at the Virginia Truck Experiment Station were found to bear conidia and conidiophores of *Peronospora effusa* [*R.A.M.*, xi, p. 420] in 1930 and 1932. Sections of the diseased fruit showed that the mycelium of the fungus had permeated the pericarp, funiculus, and the integument of the ovule. Oospores were found in profusion in the infected leaves but not in the seeds of the same plants. Possibly the introduction of *P. effusa* into new areas may be effected to some extent by means of the seed.

JAGGER (I. C.) & CHANDLER (N.). **Physiologic forms of Bremia lactucae on Lettuce.**—Abs. in *Phytopath.*, xxiii, 1, pp. 18–19, 1933.

In breeding lettuce for resistance to mildew (*Bremia lactucae*) [*R.A.M.*, xi, p. 491], several apparently distinct physiologic forms of the fungus have been detected. In 1922 nine lettuce varieties showed a high degree of resistance in trials in Florida, and the same varieties behaved similarly in succeeding years at Chula Vista, California. In 1926 only two of these varieties showed marked resistance in England to the apparently distinct form of the mildew occurring there. In 1927 three varieties proved highly resistant to a third physiologic form then prevalent in Imperial Valley, California. The French variety Romaine blonde lente à monter has hitherto shown considerable resistance to all forms of *B. lactucae* encountered. Crosses between this variety and New York or Iceberg have given several highly resistant strains at Chula Vista. In central California there seems to be a fourth form of mildew capable of attacking these hybrids, but from which the 'Imperial D' strain is practically immune.

KORDES (H.). **'Sclerotinia-Welke' der Treibhausgurken.** [*Sclerotinia* wilt of glasshouse Cucumbers.]—*Obst- und Gemüsebau*, lxxix, 1, p. 5, 2 figs., 1933.

A popular note is given on the occurrence and control of cucumber *Sclerotinia* wilt (*S. sclerotiorum*) in Germany [*R.A.M.*, xi, p. 620]. The fungus attacks the cortex and vascular bundles of the stem base (up to a height of 10 cm. from the ground), causing a rapid wilting. Young fruits are also liable to infection. The diseased areas of the stem should be excised and the wounds painted with tree wax, and after the harvest the houses should be sprayed with 1 per cent. formalin before renewing the compost.

NICOLAS (G.) & AGGÉRY (B.). **Remarques sur Gloeosporium lagenarium (Passer.) Sacc. et Roum. et Colletotrichum oligochaetum Cav. et sur leur mode de conservation.** [Observations on *Gloeosporium lagenarium* (Passer.) Sacc. & Roum.

and *Colletotrichum oligochaetum* Cav. and on their mode of perpetuation.]—*Comptes rendus Soc. de Biol.*, cxii, 2, pp. 125–126, 1933.

Watermelons from the vicinity of Toulouse were observed, in October, 1932, to bear acervuli typical of *Gloeosporium lagenarium* (without setae) as well as those of *Colletotrichum oligochaetum* (with setae) [*R.A.M.*, x, p. 772]. The examination of a melon similarly infected also showed both types of acervuli, which evidently belong to the same fungus; the black setae are apparently characteristic of the later stages of attack, when the parasite has ruptured the epidermis. In the writers' opinion, *G. orbiculare* and *G. cucurbitarum* should also be referred to *G. lagenarium*.

After 24 hours in water at 14° to 18° C. the conidia produce chlamydospores, which in turn form hyphae at 24° 13 days later. The perpetuation of the fungus is thought to be effected by means of these organs.

SLEETH (B.). **Relationship of Fusarium niveum to the formation of tyloses in Melon plants.**—Abs. in *Phytopath.*, xxiii, 1, p. 33, 1933.

Abundant tyloses were observed in one- to four-month-old melon plants infected by *Fusarium niveum* [*R.A.M.*, xii, p. 269], their occurrence being apparently correlated with the presence, quantity, and proximity of the fungus. Of the infected vascular bundles of the same plant, a quarter to all may be completely filled by tyloses, few or none of which are found in the healthy ones. When the mechanical obstruction of the vessels by the tyloses reaches a point sufficient to impede the normal flow of water and nutrients in the plant, stunting and wilting take place.

PETRI (L.). **Sopra la opportunità di applicare le odierne nozioni della genetica alla produzione di nuovi portinnesti per la Vite europea.** [On the opportunity of applying modern ideas of genetics to the production of new stocks for the European Vine.]—*Boll. R. Staz. Pat. Veg.*, N.S., xii, 4, pp. 343–360, 1932.

In support of his view that official encouragement should be given in Italy to the systematic production of new vine hybrids resistant to leaf roll and possessing a high grafting affinity for the native Italian vines, the author describes and discusses in detail instances in which vines grafted on American stocks (especially Riparia × Rupestris 3309, Riparia × Berlandieri 34 E.M., 420 A, 157″, and Rupestris du Lot) have, all over Italy, shown a rapid decline which takes the form of premature senility developing most often about the sixth or seventh year after grafting. The usual symptoms consist in a gradual loss of growth activity in the aerial parts, which wilt from the top downwards, and in the roots, though the latter do not rot until the two- or three-year-old wood has ceased to shoot; marked rachitism (i.e., pronounced shortening of the internodes, small leaves, false side shoots, and deficient chlorophyll in the interveinal parts of the leaf blades); and, sometimes, reddening of the leaves. The condition occurs seven or more years after grafting, on single vines and groups, and tends to spread. It may affect vines grafted four or five years earlier

while others near by of the same variety grafted on the same stock 20 years ago are still flourishing. It does not affect hybrids exclusively, nor is it due to any acquired defect in the wood of the American vines. Italian ungrafted vines are usually unaffected. That it is definitely due to some pathogenic agency is clear from the fact that it is not found uniformly on all vines of the same age in any one locality, but is sporadic, the activity of the pathogen being apparently favoured by local conditions, and also from its tendency to spread. It is presumed that the disease is due to a virus similar to but distinct from that causing leaf roll ('arriciamento' or 'court noué') [*R.A.M.*, xi, p. 21].

In this connexion, the author states that he found endocellular cordons [ibid., ix, p. 83] in the wood of vines affected with mosaic from Czecho-Slovakia [ibid., xi, p. 280], a fact already noted by Straňák, so that this disease is evidently related to leaf roll. Mosaic vines grafted on to American stocks lost their mosaic characters and acquired those of leaf roll, confirming the close affinity of the diseases. A mosaic different from that reported from Bohemia has occasionally been observed in Italy on vines affected with leaf roll. It would appear that a mosaic virus is probably present in vines at the same time as the virus causing chronic rachitism. It is, therefore, very possible that the Italian disease under consideration is due to an insect-transmitted virus and investigations have been started in order to test this explanation of the decline of the vines in reconstituted vineyards all over Italy.

Any attempt to reconstitute Italian vineyards in future must be based on a methodical study of stocks in relation to their soil and climatic requirements and their grafting affinity with Italian vines, this work being supplemented by phytopathological observation of the wilt symptoms which indicate the presence of the cause of premature senility. Other stocks than those in common use must be tested and preference should be given, for reasons which are indicated, to the European-American hybrids with one-half *Vitis vinifera* 'blood'.

DUFRÉNOY (J.). **Les contaminations successives de la Vigne par le Plasmopara viticola.** [Successive infections of the Vine by *Plasmopara viticola*.]—*Comptes rendus Soc. de Biol.*, cxii, 3, pp. 326–328, 1 graph, 1933.

In further experiments in 1932 on the lines of those carried out in 1931 [*R.A.M.*, xi, p. 422], where each successive lot of ten Cabernet vines received only one copper treatment, those sprayed on 26th May, when not more than eight leaves were developed, produced less than 50 gm. of fruit each. Those treated before flowering (27th June) gave similar but even smaller yields, although a larger number of leaves escaped infection. At the date of flowering there was a sufficient number of zoosporangia to cause infection; each vine given a single application of copper on 27th June yielded on an average $265 \pm 134$ gm. of fruit, whereas those sprayed on 29th (after rain) [ibid., xii, p. 198] produced only $85 \pm 80$ gm. A week later, when the number of zoosporangia was considerable, each vine treated on 5th July gave an average yield

of 200 ± 80 gm., while on those sprayed after rain two days later the grapes were totally destroyed. The average yield of the vines given nine treatments was 360 ± 140 gm.

ROUAYROUX (R.). **Les bouillies cupriques à l'alun.** [Cupric sprays with alum.]—*Prog. Agric. et Vitic.*, xcix, 2, pp. 36–38, 1933.

The author (who stresses the fact that he is a chemist and is not acquainted with the action of fungicidal sprays on the vine) states that the chemical and physical properties [which are briefly discussed] of the precipitate formed when alum is added to Burgundy mixture, and the fact that it contains a very appreciable quantity of free copper, would indicate the greater fungicidal efficacy and the greater adhesiveness of the Burgundy plus alum spray, and would warrant a trial of the latter for the control of vine mildew [*Plasmopara viticola*: but cf. *R.A.M.*, xii, p. 139]. In an editorial note to this paper, a warning is, however, given against too extensive preliminary trials, since the free copper in the spray may easily prove injurious to the vine.

RAVAZ (L.). **Chronique. L'excoriose.** [Current events. Excoriosis.]—*Prog. Agric. et Vitic.*, xcix, 2, pp. 29–33, 5 figs., 1933.

The author states that in the autumn of 1932 numerous French vine-growers reported the presence of pycnidia of *Phoma flaccida*, the cause of excoriosis [*R.A.M.*, xi, p. 359], on the pruning wood of their vines, this indicating a widespread outbreak of the disease of a severity comparable to that in 1924 [ibid., iv, p. 524]. Observations have shown that besides the cortical tissues, the fungus also enters the dormant buds, especially at the base of the current year's branches, and either kills them outright or only partially invades them. In the latter case, the buds very probably produce the most diseased wood during the new season. In pruning, care should be taken to choose, for forming the new shoots, branches free from infection, but where this is not possible, the further spread of the disease may be minimized by the excision of the two lowermost eyes on the shoots, this entailing a somewhat taller training of the vines.

HECTOR (G. P.). **Appendix I. Annual Report of the Economic Botanist, Bengal, for the year 1931–32.**—*Ann. Rept. Dept. of Agric. Bengal for the year 1931–32*, pp. 29–44, 1932.

The following items of phytopathological interest occur in this report. Encouraging results in the control of the betel vine [*Piper betle*] diseases caused by *Rhizoctonia*, *Phytophthora*, and *Sclerotium rolfsii* [*R.A.M.*, xi, p. 426] were given by the application of a soil disinfectant, 'kerol', to the ridges at a dilution of 1 in 800. Bordeaux mixture is ineffectual alone against *Rhizoctonia* and *S. rolfsii*, but proved useful as an adjunct to kerol. In the Bonhoogly district *Rhizoctonia* attacked the vines in a most virulent form, mortality being particularly heavy in the lines to which muriate of potash had been applied at the rate of 100 lb. per acre. Infection was arrested by treatment with kerol.

An epidemic of potato late blight (*P. infestans*) occurred in the

plains of Dinajpur and Rangpur, where spraying demonstrations with 1 per cent. Bordeaux mixture were given.

RUSSELL (T. A.). **Report of the Plant Pathologist, 1932.**—*Rept. Dept. of Agric., Bermuda, for the year 1932*, pp. 24–30, 1933.

During the period under review, blight (*Septoria apii*) destroyed one-third of the celery crop in Bermuda, and the damage caused by *Sclerotinia sclerotiorum* was almost as great on carrots, lettuces, and tomatoes. News was received from Montreal in March that two consignments of carrots from Bermuda had shown much rotting on arrival and on examination of the returned crates and of similar carrots in Bermuda, the rotting was determined to be due to *S. sclerotiorum*. Infection of tomatoes with *S. sclerotiorum* in the field always started in a leaf and passed down the petiole into the stem. Tomato fruits were generally attacked through the fruiting spur, injury taking the form of a greyish-brown rot. Cabbages in a neighbouring field were also seriously attacked.

A survey made in the field and among rejected fruit at the packing house showed that the commonest disease of green tomatoes was bacterial soft rot (*Bacillus carotovorus* or *B. aroideae*). Brown rot (*Rhizoctonia* [*Corticium*] *solani*) was also occasionally found causing a circular, dull brown, zonate spot near the blossom end.

*Gloeosporium limetticolum* was troublesome on the young shoots of limes. *Peronospora schleideni* occurred on onions grown from sets brought from Canada, the plants being so badly attacked as to be worthless.

HANSFORD (C. G.). **Annual Report of the Mycologist.**—*Ann. Rept. Dept. of Agric. Uganda, for the year ended 31st December, 1931* (Part II), pp. 59–60, 1932.

In this report [cf. *R.A.M.*, xi, p. 353] the author states that during the season 1931–2 cotton boll shedding caused by black arm disease (*Bacterium malvacearum*) [see below, p. 439] in Uganda was unimportant, and that on the whole this disease was not a major factor in limiting crop production. In an Appendix an account is given of an experiment carried out at Kampala in which 16 plots each of 121 cotton plants were sown with seed (A) untreated, (B) immersed for 15 minutes in a culture of *Bact. malvacearum*, (C) delinted in sulphuric acid for 35 minutes, washed, immersed in dilute mercuric chloride for 30 minutes, then washed again, and (D) dusted with Dupont granosan. Each treatment was applied to four sub-plots, and records were made of the crop produced by each plant. A preliminary analysis of the results indicated that estimating the amount of infection per plot by multiplying the number of infected plants by the number of days each was infected, there was significantly greater infection in plots B and less in plots C than in A or D. The disease spread from the plants showing primary infection to the surrounding ones slowly and evenly, until following a period of greater rainfall a rapid rise took place in the middle of October. The spread then became slower until it rose to a second peak in the second and third weeks of December. The direction of the spread was closely

similar to that of the flow of surface water during heavy rain, the only healthy plot remaining at the close of the experiment being one that received no rain wash from the others. The stem form of the disease rose steadily in all the plots until 9th to 21st December, when it rose rapidly in all the plots except the healthy one. By far the greater part of the stem and branch infections originated in the leaves and spread down the tissues of the petioles [ibid., xi, p. 354].

A cotton boll rot caused by *Diplodia* [*Botryodiplodia*] *theobromae* caused considerable damage in parts of Buganda Province, where the weather had been exceptionally moist. This is the first time in the author's experience that this disease has caused trouble in Uganda [cf. ibid., vii, p. 94]. Many of the infected bolls showed traces of attack by *Bact. malvacearum*, and in these the fungus was probably secondary.

In the district of Toro three- or four-year-old coffee showed a die-back characterized by a withering of the leaf edges, gradual defoliation, and abnormal young growth with shortened internodes and chlorotic, malformed, small young leaves. The lateral branches died back to the main stem in the middle of the trees, followed by the basal primaries. Finally, a small tuft of abnormal foliage remained at the top of the main stem. In some localities over 50 per cent. of the affected trees died out completely. The fine fibrous roots died off first, followed by a progressive rotting of the main roots, the damage roughly corresponding to that on the aerial parts. The bark of the dying roots was soft, pulpy, and easily stripped off. All the evidence obtained indicated that no highly pathogenic fungus was responsible.

In the Semliki Valley coffee roots bore well developed rhizomorphs of *Armillaria* [*mellea*], the trees being split into sectors exactly as occurs with tea in Ceylon [cf. ibid., x, p. 275]. This appears to be the first record of the disease on coffee in Uganda.

Sweet potato tubers were attacked by *B. theobromae*, *Rhizoctonia bataticola* [*Macrophomina phaseoli*], and *Fusarium* spp. Inoculations of sound tubers indicated that *B. theobromae* and *Fusarium* are wound parasites, but that *M. phaseoli* can attack sound tubers in the field.

Other records made during the period under review include *Peronospora* sp. causing defoliation and death of *Ocimum basilicum*, the introduction of which into Uganda has proved a failure owing to attack by this fungus; *Cercospora sesami* [ibid., viii, p. 200] causing a severe leaf spot of *Sesamum* [*indicum*]; a wilt of *Crotalaria striata* associated with various *Fusaria*, including *F. tracheiphilum*; and a serious leaf spot and defoliation of *Phaseolus* spp. and *Vigna* spp. caused by a *Colletotrichum* and an *Ascochyta*; in some seasons this disease is serious enough to jeopardize the cultivation of beans at Bukalasa, very little crop being produced.

Mosaic is the only disease of sugar-cane that remains of economic importance in Uganda [ibid., x, p. 298]; P.O.J. 2878 still shows promise of becoming the standard cane for the near future, and has not so far shown the undesirable characters of P.O.J. 2725 and 2727.

**Report of the West Virginia Agricultural Experiment Station for the period from July 1, 1930, to June 30, 1932.**—*West Virginia Agric. Exper. Stat. Bull.* 254, 60 pp., 6 figs., 1 map, 1932. [Received April, 1933.]

The following are among the items of phytopathological interest occurring in this report in addition to those already noticed from other sources. A comprehensive study has been made of the reaction to rust [*Gymnosporangium juniperi-virginianae, G. globosum*, and *G. germinale*: see below, p. 452] of 66 commercial apple varieties, some of which are practically immune and may be used in the vicinity of red cedars [*Juniperus virginiana*] without serious damage.

Overwintered apple leaves in several orchards in 1930 bore considerable quantities of *Mycosphaerella pomi*. In a series of inoculation tests on twelve apple varieties in 1931, Grimes was found to be most susceptible to infection by two species of *Penicillium* and one of *Alternaria*, followed by Delicious, Golden Delicious, McIntosh, Wealthy, and Jonathan, while York, Stayman, Winesap, and Baldwin were the most resistant. In addition to the 'papular' and 'blister' types of apple measles [ibid., xii, pp. 12, 378], a third form has been observed producing very numerous pimples, smaller than those of either of the other types, on the York, Jonathan, and Rome varieties.

In the order of excellence of finish, dry lime-sulphur was the best of the fungicides tested as substitutes for lime-sulphur in the control of apple diseases, followed by calmosul and flotation sulphur [ibid., xii, p. 29].

Data obtained in the Eastern Panhandle orchards indicate that the increased incidence of apple scald [ibid., xi, p. 659] following nitrogen fertilization may be largely due to delayed maturity of the fruit rather than to the presence of more nitrogen in the apple. Yorks picked on 6th October, 1931, scalded severely irrespective of nitration, whereas the incidence of the disease declined progressively in the fruit picked on 14th and 21st October. The amount of scald in nitrated fruit picked on 6th October was 85 per cent. compared with 83 per cent. for the untreated controls, no oiled paper being used for wrapping. On the 14th October picking the corresponding figures for wrapped nitrated fruit, unwrapped nitrated, wrapped but not nitrated, and neither nitrated nor wrapped were 22, 72, 17, and 54, respectively. On fruit picked on 21st October the unwrapped nitrated fruit showed 53 per cent. scald and the unwrapped and untreated 33.

The pathogenicity to watermelon of 23 collections of *Fusarium niveum* [ibid., xii, p. 269] from different parts of the United States was found to vary with the constitution of the host, but all the varieties and hybrids tested showed some degree of susceptibility to the most virulent forms of the wilt organism. From wilted plants growing in separate boxes of soil infested with individual collections, dissociants were recovered which were identical in two cases with those already obtained in the cultures. Evidently, therefore, dissociation may occur in the soil and is presumably a common feature of the wilt fungus. Cuttings placed in a filtrate of *F. niveum* wilted in eight hours when exposed in the laboratory

but showed no such effect when kept under a bell jar. The $F_2$ progeny of crosses between an inedible, wilt-resistant Russian watermelon and the edible, susceptible Early Fordhook and Grey Monarch varieties show a wide range of susceptibility to *F. niveum* and of palatability.

The *Nectria* which causes black walnut [*Juglans nigra*] canker [ibid., xi, p. 551] has been found to be closely related to *N. galligena*. A similar canker has been observed on butternut [*J. cinerea*] and certain exotic species of *Juglans*, but the *Nectria* from these hosts is not pathogenic to *J. nigra*. Conversely, the fungus from the latter does not infect butternut or black oak [*Quercus nigra*], another host of a very similar *Nectria* canker.

**Biennial Report, Utah Agricultural Experiment Station, July 1, 1930, to June 30, 1932.**—*Utah Agric. Exper. Stat. Bull.* 235, 80 pp., 18 figs., 1932. [Received April, 1933.]

The following items are taken from the section of this report (by H. L. Blood and F. B. Wann) on botany and plant pathology (pp. 49–54). Bacterial canker of tomatoes [*Aplanobacter michiganense*] [*R.A.M.*, xii, p. 267] was so serious on early crops in the Bountiful district that production was largely discontinued; on canning tomatoes infection was generally less severe. The causal organism is capable of surviving the winter on plant refuse and reinfecting the new crops.

Curly top [ibid., xii, p. 196] was also responsible for heavy damage to tomatoes, affecting 56·7 and 42 per cent. of the crops in 1930 and 1931, respectively. The symptoms of this disease include a retardation of terminal growth accompanied by compression of the young leaves at the stem apex, reflexed, yellow leaf blades, stunting, and intensified vein coloration. Biochemical investigations showed an accumulation of carbohydrates and ash constituents in the foliage, combined with a rise in osmotic pressure. The abundance of alkaloids in diseased leaves suggests a possible interference with protein synthesis. Catalase activity was found to be much lower in curly top than in normal plants. Viroflay spinach has been very useful in overwintering the leafhoppers [*Eutettix tenella*] required for curly top resistance studies. Tomatoes are further liable to psyllid yellows, which is epidemic on potatoes [ibid., xii, p. 187 and below, p. 461]. So far intensive work on this problem has been precluded by the difficulty of carrying the insect vector (*Paratrioza cockerelli*) through the winter. The symptoms of the disease on the tomato are similar to those on potatoes and include enlarged nodes and cupping and yellowing of the foliage. In severe cases the growth habit of the plants is markedly altered. The feeding of only a few insects on potato plants may result in the development of yellows symptoms that persist until the removal of the insects. Light intensity has also been shown to influence the expression of psyllid yellows, indicating that the disturbance may be of physiological origin rather than due to a virus.

Apparently healthy soil was heavily infested with bunt [*Tilletia foetens*] spores on 28th August, 1930, and wheat sown at approximately 10-day intervals from 1st September to 1st November.

Observations made on 1st July, 1931 indicated (1) that the spores remained viable in the soil for a considerable time in the autumn; (2) that seedling infection may occur throughout the period of the sowings; and (3) that the incidence of bunt declines proportionally to the length of time from spore dissemination.

LEEFMANS (S.). **Ziekten en plagen der cultuurgewassen in Nederlandsch Oost-Indië in 1930.** [Diseases and pests of cultivated crops in the Dutch East Indies in 1930.]—*Meded. Inst. voor Plantenziekten*, 81, 84 pp., 1933.

This report, prepared on the usual lines [*R.A.M.*, x, p. 298], contains numerous interesting items, of which the following may be mentioned. In two districts of the Kedoe Residency (Java) the incidence of slime disease [*Bacterium solanacearum*] among the potato crops amounted to 15 and 30 per cent., respectively [ibid., x, p. 402].

Some 10 per cent. of the cabbage crops in one coastal district of west Sumatra were attacked by *Bact. campestre* [*Pseudomonas campestris*: ibid., x, p. 299].

Owing to the prevalence of bark and root diseases, 20 to 30 per cent. of the *Hevea* rubber trees in the older native plantations of the Tapanoeli Residency (Java) have become unproductive. *Helicobasidium compactum* [ibid., x, pp. 524, 557] was isolated from both young and older rubber material examined at the (Java) Central Rubber Experiment Station. *Helminthosporium* [*heveae*: ibid., vii, p. 308; xi, pp. 2, 433] is gaining ground in the Besoeki district of Java.

Sugar-cane was locally affected in parts of Java by the 'kalimati' disease, attributed by Miss Wilbrink to potash deficiency [ibid., x, p. 691].

Both in Java and Sumatra the principal damage to tea roots was caused by *Rosellinia arcuata* and *R. bunodes* [ibid., vii, p. 65; ix, pp. 162, 614]. Of the 70 cases of attack by these fungi examined in Java, 47 were on tea alone, 8 on *Leucaena glauca*, 6 on *Indigofera arrecta*, 4 on *Tephrosia candida* (the three last-named all *R. bunodes*), 3 on *Crotalaria* (both species on *C. usaramoensis*, *R. bunodes* on *C. anagyroides*) [ibid., x, p. 525], and one each (species not determined) on *Acacia decurrens* and *Albizzia falcata*.

In Central Java the most prevalent fungus on cacao roots is *F. lamaoensis* [*F. noxius*].

In the Atjeh Residency (Java) nutmeg was severely damaged by *Coryneum myristicae* [ibid., xi, p. 673], which rendered up to 50 per cent. of the crop unmarketable. The same fungus caused heavy losses of nutmeg in the districts under the supervision of the Tea Experiment Station, where *F. noxius*, *Phytophthora* sp., *Diplodia* sp., and cobweb fungi [thread blights of the Marasmioid group: ibid., vii, p. 675] were also reported.

Pepper [*Piper nigrum*] in the Atjeh and Palembang Residencies suffered extensively from an obscure die-back of the branches [cf. ibid., ii, p. 87]. In the former district the same plant is affected by a disturbance in which the fruit-bearing shoots are replaced, without apparent cause, by those producing nothing but leaves.

*Melia azedarach* trees in the east Brantas silvicultural area of Java were affected by a gummosis attributed to *Phoma* sp.

ORTON (C. R.) & STANLEY (A. R.). **Serum agglutination studies with soft-rot bacteria.**—Abs. in *Phytopath.*, xxiii, 1, p. 27, 1933.

Studies with fifty isolations of bacteria of the soft rot group (including *Bacillus aroideae*, *B. carotovorus*, and *B. phytophthorus*) showed that the organisms of the soft rotting group are not to be distinguished specifically by agglutination tests [*R.A.M.*, xi, p. 700]. For instance, two cultures of *Bacterium dissolvens* isolated from stalk rot of two sweet maize varieties [ibid., xi, p. 446] are identical in ordinary physiological tests but show no sign of cross-agglutination. With an antiserum from one of these cultures, however, cross-agglutination is obtained with *B. coli communis* and a strain of *B. aroideae* isolated from pe-tsai [*Brassica pekinensis*] in Japan. In the same way *B. aroideae* antiserum agglutinated two cultures of *Bact. tabacum* from Pennsylvania as much as, or more than, a culture of *B. aroideae* from Japan. It is concluded that the soft rot bacteria and such leaf-spotting organisms as *Bact. tabacum* are merely variants of *B. coli* and not distinct species.

GREANEY (F. J.). **Method of estimating loss in yield from cereal diseases.**—*Phytopath.*, xxiii, 1, p. 12, 1933.

For the past eight years in succession field experiments have been conducted in Manitoba to determine the value of sulphur dusting at different rates and intervals for the control of *Puccinia graminis*, and other cereal rusts [*R.A.M.*, xi, p. 286]. In order to use the data thus acquired in estimating losses, rust percentage and yield have been correlated in a single standard variety, the results being summarized annually in the form of correlation coefficients and regression equations. The regression of yield on percentage rust was found, in statistically significant correlation coefficients, to be linear, indicating that uniform increases in rust are accompanied by uniform reductions in yield. In this way it was possible to ascertain the reduction in yield for each 10 per cent. of black rust and so to calculate the annual losses from this source.

SĂVULESCU (T.). **Rumania: black rust of cereals in 1932 and the measures taken to prevent future outbreaks.**—*Internat. Bull. of Plant Protect.*, vii, 2, pp. 29–31, 1933.

Black rust of wheat (*Puccinia graminis*) caused excessively heavy damage in Rumania in 1932, when losses amounting to at least 50 per cent. were sustained from this source in the Danube Valley [*R.A.M.*, xii, p. 150]. The high yielding, long- and yellow-strawed, broad-leaved, late maturing, widely spaced spring wheats were the most severely attacked.

The following varieties are officially recommended, on the basis of their resistance to forms 13 and 20 of brown rust (*P. triticina*) as suitable for cultivation in the Danube Valley [cf. ibid., xi, p. 156]: American 15 and 26, Sandu-Aldea 22, 70, and 120, Ţigăneşti 714, and Sămânţa 117, while Sandu-Aldea 224, Odvoş 3,

and Filipescu are susceptible. In Banat and southern Transylvania, Sămânţa 117, Bankut 1·201, and Odvoş 241 should be grown, the two last-named being also adapted to northern Transylvania. In northern Moldavia and the steppes, the wheat selection No. 11 is superior to all others, while the best for Dobrudja are Urias cu pana roşie [with pink panicles] and Sămânţa 117. A reduction in the incidence of *P. graminis* can only be effected by the cultivation of early varieties and by the extermination of the barberry, an official campaign against which has been initiated.

Stakman (E. C.), Hines (L.), Ukkelberg (H. G.), & Butler (W.). **Distribution of physiologic forms of Puccinia graminis tritici in relation to stem-rust epidemiology in 1932.**—Abs. in *Phytopath.*, xxiii, 1, p. 34, 1933.

Contrary to the general rule, durum wheats suffered more severely from stem [black] rust (*Puccinia graminis tritici*) in 1932 than the bread varieties in the upper Mississippi Valley. This is explained by the distribution of the physiologic forms of the fungus in that year in the United States and northern Mexico [*R.A.M.*, xi, p. 436]. Fifteen forms were isolated from 465 collections, of which 92 per cent. were constituted by five forms as follows: form 38, 46 per cent.; 49, 27 per cent.; 36, 9 per cent.; 19, 5 per cent.; and 11, 5 per cent. Forms 38 and 19 are virulent on the durum varieties but cause little damage to the hard red spring wheats; the reverse is true of forms 49 and 36, while 11 attacks both groups severely. The following are the percentages of collections in representative areas from which durum-infecting forms were isolated: Mexico 54, Texas 67, Minnesota 61, and North Dakota 56. Of the Mexican and Texas collections, 54 and 63 per cent., respectively, were forms harmless to most hard red spring wheats. Field observations and spore trapping data support the evidence of the physiologic form survey that the rust was blown northward from Mexico and Texas, though certain forms, especially 36, apparently originated principally on northern barberries.

Johnson (C. O.) & Miller (E. C.). **Effect of leaf-rust infection on water economy and growth of two Wheat varieties.**—Abs. in *Phytopath.*, xxiii, 1, pp. 19–20, 1933.

Two spring wheat varieties, Pusa No. 4 and Warden (C.I. 4994), the former susceptible and the latter resistant to leaf [brown] rust [*Puccinia triticina*: *R.A.M.*, xii, p. 274], were grown in sealed containers in the greenhouse and the water requirement determined for plants of various groups, arranged according to the time of initial rust infection. The following amounts (in grams) were required for each group of the two varieties: inoculated first in the seedling stage, 905·3 and 500·8; in the jointing stage, 869·9 and 490·0; in the boot stage, 791·4 and 509·3; when fully headed, 619·1 and 480·7; uninoculated controls, 456·8 and 510·8. In the susceptible Pusa No. 4, the water requirement increased with the continued association of host and parasite, involving a general check to growth and retardation of root development and date of maturity, none of which features was so pronounced in the resistant Warden.

KILDUFF (T.). **Inheritance of bunt and loose smut reaction and of certain other characters in Kota × Red Bobs and Garnet crosses.**—*Canadian Journ. of Res.*, viii, 2, pp. 147–172, 1933.

An account is given of the writer's genetic studies in Alberta on the $F_2$, $F_3$, and part of the $F_4$ progeny of two hard red spring wheat crosses, Kota × Red Bobs and Kota × Garnet, in respect of their reaction to bunt (*Tilletia tritici* and *T. levis*) [*T. caries* and *T. foetens*] and loose smut (*Ustilago tritici*), certain other characters also being taken into consideration [cf. *R.A.M.*, xi, p. 360, *et passim*].

Kota and Red Bobs were highly susceptible both to Kota bunt (*T. foetens*) and to that from Red Bobs (mainly *T. caries*); the former collection was much more virulent than the latter. The heritable nature of the bunt reaction was clearly demonstrated. The percentage of infection found in the $F_3$ hybrids covered the whole infection range of the parents; no transgressive segregation was observed. In the Kota × Garnet hybrids evidence was obtained of the presence in Garnet of a single major factor for resistance to Kota bunt. Some of the $F_3$ plants showed resistance equal to that of the Garnet parent, a larger number showed the high susceptibility of Kota, but the majority fell in the classes showing 20 to 50 per cent. bunted.

Relative susceptibility to loose smut was shown by Kota, while Garnet was resistant and Red Bobs immune under the experimental conditions. No genetic hypothesis can be advanced to explain the data in regard to loose smut reaction owing to the absence of agreement in infection percentages in the $F_3$ and $F_4$ generations. It is suggested that some factor of a non-physiological order may be concerned in the relative resistance to *U. tritici* of the parental varieties.

BRESSMAN (E. N.) & HARRIS (L. E.). **Inheritance in Albit Wheat of resistance to bunt, Tilletia tritici.**—*Journ. Agric. Res.*, xlvi, 4, pp. 361–365, 1 pl., 1 chart, 1933.

In the autumn of 1930, the seed for the $F_3$ generation of crosses at Corvallis, Oregon, between Hybrid 128 and Albit wheat [cf. *R.A.M.*, xi, p. 565] was heavily coated with spores of *Tilletia tritici* [*T. caries*] physiologic form VIII, to which Hybrid 128 is susceptible and Albit resistant. Albit is the result of a cross between Hybrid 128 and White Odessa and possesses the bunt-resistance of the latter.

In the Hybrid 128 × Albit crosses the $F_1$, $F_2$, and $F_3$ progenies were all morphologically identical with the parent varieties and it was only through the segregation for bunt resistance that it could be determined that hybridization had been effected. The $F_3$ generation was represented by four families and a total of nearly 5,000 plants. The distribution of the $F_3$ rows into 10 per cent. classes for bunt infection agreed fairly closely with a 1 : 2 : 1 ratio when the 0–10 class was taken as resistant and those over 70 per cent. as susceptible; family no. 3 showed a perfect segregation of 1 : 2 : 1 with 4 resistant, 8 segregating, and 4 susceptible rows in a total of 16.

It is considered that Albit carries one main dominant factor for resistance which is the same (MM) as that present in its White Odessa parent [ibid., x, p. 649]. The results hitherto obtained show that this factor conveys resistance to physiologic forms II, III, V, VI, and VIII but not to the other forms I, IV, VII, IX, and X of Bressman's classification [ibid., xi, p. 33]. Hybrid 128 is entirely susceptible and carries no factor for resistance to any of the physiologic forms of *T. caries*.

YOUNG (P. A.). **Soil infestation by chlamydospores of Tilletia levis in Montana.**—Abs. in *Phytopath.*, xxiii, 1, p. 39, 1933.

Seed wheat, surface-sterilized with formaldehyde, was sown on four dates in September and three in October, 1931, in proximity to a wheat field, combine-harvested the previous August, in which 12 to 50 per cent. of the heads were infected by *Tilletia levis* [*T. foetens*], probably physiologic form 3 [*R.A.M.*, xi, p. 440; xii, p. 156]. The seed sown before 6th October emerged within 15 to 30 days and bore the following average percentages of bunted heads due to soil infestation by the smut: Turkey 11·9, Oro 0·8, Regal 0·9, Kharkof 2·7, Sherman 0·6, Ridit 0·2, Hybrid 128 12·5, Albit 0·2, Hussar 0·2, Kanred 12·1, Montana 36 20, and Jones Fife 21·9. Smutted Montana 36 in the control plot averaged 65 per cent. infection. The incidence of soil infestation decreased to zero in the later October sowings.

GAUDINEAU (Mlle M.). **Sur quelques facteurs de l'infection du Blé par la carie, Tilletia tritici (Bjerk.), Wint.** [On some factors affecting Wheat infection by bunt, *Tilletia tritici* (Bjerk.) Wint.]—*Ann. des Epiphyties*, xviii, 5, pp. 340–355, 3 graphs, 1932. [Received May, 1933.]

When seed of Bon Fermier (susceptible) and Florence 135 (resistant) wheat inoculated with bunt (*Tilletia tritici*) [*T. caries*] from the former variety at Versailles was sown at weekly intervals from 2nd September, 1931, until the end of March 1932, spring sowings gave the highest percentage of infections. Optimum conditions for infection prevailed at the sowings on 21st October and 24th February, these dates being very close to those on which similar conditions had prevailed in previous years. From 1st September until 15th October, 1931, the weather was consistently warmer than it was from 10th February to 25th March, so that conditions were more favourable for infection, and the attack was more severe, in the latter period than in the former [*R.A.M.*, x, p. 649]. The amount of infection that developed varied with the quantity of inoculum used [ibid., xi, p. 500].

As in earlier tests [ibid., xi, p. 442], Red Hussar, Martin Amber, and Ridit were highly resistant. Of the species of *Triticum* tested *T. monococcum* and *T. durum* were the most resistant. Inoculations gave negative results with *Aegilops triuncialis* [*T. triunciale*], but positive with *A. ventricosa* [*T. ventricosum*]. When tested on Red Hussar, inoculum from Cosel, Germany, gave 23·31 per cent. bunted plants and 14·03 per cent. bunted ears, as compared with 15·15 and 9·06 per cent., respectively, for that from Breslau, 5·78 and 3·69 per cent., respectively, for that from Halle,

and 2·16 and 1·07 per cent., respectively, for that from Zurich. No infection on Red Hussar resulted with inoculum from Lyngby (Denmark), Versailles, the Aisne, Dijon, or Colmar [ibid., x, p. 302]. A comprehensive bibliography is appended.

WINKELMANN (A.). **Weitere erprobte Beizgeräte.** [More tested disinfection apparatus.]—*Deutsche Landw. Presse*, lx, 8, pp. 93–94, 3 figs., 1933.

Technical details are given of the construction and application of three more seed disinfection apparatus officially tested and approved during 1931–2 [cf. *R.A.M.*, x, p. 373]. The Praktikus dusting machine (R. Brodmerkel, Sedanstr. 10, Augsburg) is constructed to dust 50 kg. of wheat or barley seed-grain with tillantin. If the short disinfection process is used (for which a special contrivance is supplied), the capacity is only 25 kg., the process requiring 8 to 10 minutes with 25 to 30 revolutions per minute.

The continuously working Separat apparatus (Gebr. Röber, Wutha, Thüringen) is constructed on the same lines as the Gross-Tillator 12 and 30 (Neuhaus) [loc. cit.]. The average quantity of tillantin adhering to 350 kg. of wheat seed-grain after an hour's treatment was 82·5 per cent. (71·5 per cent. after subsequent passage through the drill), the corresponding figures for 650 kg. being 76·75 and 64·75 per cent., respectively. In a similar test with rye 78·5 to 88 per cent. tutan was found adhering to the seed-grain (400 to 650 kg.) after an hour's treatment.

The Miag (formerly known as Germator, Mühlenbau- und Industrie A.-G., Brunswick) is the first continuously working short disinfection process apparatus to be tested in Germany [ibid., xi, pp. 117, 502]. Satisfactory results are stated to have been obtained with the three machines here described.

SPRAGUE (R.). **Association of Cercosporella foot rot with a specific ecological area.**—Abs. in *Phytopath.*, xxiii, 1, pp. 33–34, 1933.

In general, the foot rot of wheat caused by *Cercosporella herpotrichoides* [*R.A.M.*, xi, p. 503] is confined to those prairie sections of Oregon, Washington, and Idaho in which the fine sandy loam soils were formerly covered by a grass sod with *Festuca* spp. predominating. A list of the prominent plants in the affected sections is given.

NOBLE (R. J.). **Basal glume rot.**—*Agric. Gaz. New South Wales*, xliv, 2, pp. 107–109, 2 figs., 1933.

A brief, popular account is given of the symptoms and geographical distribution of basal glume rot of wheat (*Bacterium atrofaciens*) [*R.A.M.*, xi, pp. 227, 544], which, first recorded in New South Wales in 1924, has since been observed in widely scattered sections of the wheat belt there, and was again present in 1932. It does not appear to have caused any serious loss of yield so far, and the ordinary agricultural practices, such as burning the stubble, fallowing, and seed treatment, are expected to keep it under control.

Elliott (Charlotte) & Johnson (A. G.). **Basal glume rot of Barley.**—Abs. in *Phytopath.*, xxiii, 1, p. 10, 1933.

Barley heads received from Arkansas in 1931 showed the dull brownish-black kernel bases commonly associated with basal glume rot of wheat (*Bacterium atrofaciens*) [see preceding abstract], some typical specimens of which were sent at the same time. The organism in question was isolated from both wheat and barley, and cross-inoculation experiments gave positive results.

Holton (C. S.). **Inheritance of chlamydospore characteristics in Oat-smut fungi.**—Abs. in *Phytopath.*, xxiii, 1, p. 16, 1933.

The $F_1$ chlamydospores of crosses between monosporidial lines of the oat smuts, *Ustilago avenae* and *U. levis* [*U. kolleri*] are echinulate. In the $F_2$ generation both echinulate and smooth spores were segregated, the former invariably predominating. In hybrids between the buff smut fungus with smooth, hyaline spores resulting from a cross between two $F_1$ monosporidial lines [*R.A.M.*, xi, p. 37] and *U. kolleri*, colour segregated in a 3 : 1 ratio. The $F_1$ chlamydospores of crosses between the buff smut and *U. kolleri* were smooth and brown, and in those between the former and *U. avenae* echinulate and brown.

Zade (A.) & Arland (A.). **The relation of host and pathogen in Ustilago avenae: a reply.**—*Bull. Torrey Bot. Club*, lx, 2, pp. 77–87, 1933.

In this paper the authors discuss in some detail the various criticisms directed by Dr. Laura Kolk [*R.A.M.*, x, p. 722] against the methods elaborated by them for the artificial inoculation of oat grains with *Ustilago avenae* [ibid., ii, p. 214; iv, p. 158; v, p. 27], and proceed to show that their method as now practised is simple and follows more natural lines than Kolk's dry spore-dusting method after dehulling the oat grains. Their method (termed 'evacuation process') consists in the removal by suction of the air present between the glume and the kernel, allowing of the subsequent intake by the grain of a suspension of the smut spores which then rapidly develop a resting mycelium when the grain is spread on moist blotting paper kept in a moist atmosphere. While the dry spore-dusting method may be useful in the study of inheritance of smut resistance, the authors claim supremacy for their own method for purposes of testing the efficacy of grain disinfectants for the control of the smut.

Eddins (A. H.). **Infection of Corn plants by Physoderma zeae-maydis Shaw.**—*Journ. Agric. Res.*, xlvi, 3, pp. 241–253, 4 figs., 1933.

This is a full report of the results obtained up to date in the Florida experiments on the artificial infection of maize plants with the brown spot fungus, *Physoderma zeae-maydis*, brief references to which have already been noticed [*R.A.M.*, x, p. 646; xi, p. 771]. In addition to the information already given, it is stated that all the subspecies tested (including 38 southern varieties of dent and flint maize) were found to be susceptible. The work also indicated that it may be possible to develop resistant strains of certain

varieties by inbreeding, but it is stated that the behaviour of such lines in the greenhouse is not a true indication of their reaction in the field. In the test plots more brown spot developed in the wet season of 1930 than in the dry season of 1931, and the relative susceptibility of the different varieties varied in the two years.

As regards the longevity of the sporangia of *P. zeae-maydis*, it was found that infection was produced by sporangia that had been kept for three years in test tubes buried a foot deep in the ground, in a bottle for the same length of time in the laboratory, in maize leaf sheaths exposed to the weather for two years, as well as by sporangia collected from diseased areas in green leaf sheaths.

Dickson (J. G.), Link (K. P.), & Dickson (A. D.). **Nature of resistance of Corn to seedling blight.**—Abs. in *Phytopath.*, xxiii, 1, p. 9, 1933.

Previous investigations in Wisconsin denoted that resistance in maize seedlings to the blight caused by *Gibberella saubinetii* is correlated with rapid maturation of the tissues, especially of the cortical structures [*R.A.M.*, xi, p. 447]. The embryonic tissues in resistant seedlings have shown a much higher degree of acidity, associated with the presence of polyglucuronides, than similar regions in susceptible plants; at 12° to 16° C. the resistant seedlings contained some 20 per cent. more uronic acids than the susceptible ones. Dilute solutions of the uncombined acids gave a $P_H$ of 2·5 to 3·0 and reduced fungus growth when added in low concentrations to the culture solutions. The calcium salts of the acids were much less active in inhibiting the development of *G. saubinetii*.

Rodenhiser (H. A.) & Barnes (B. F.). **Pathogenicity of certain hybrids of covered and loose smuts of Sorghum.**—Abs. in *Phytopath.*, xxiii, 1, pp. 30–31, 1933.

Intraspecific crosses were made by pairing monosporidial lines of physiologic forms 1 and 2 and of 1 and 3 of *Sphacelotheca sorghi*, while interspecific hybrids were obtained by pairing a monosporidial line of form 2 and one of form 3, respectively, with a monosporidial line of *S. cruenta* [*R.A.M.*, xii, p. 89]. On the susceptible Reed kafir variety the intraspecific crosses were more virulent than the inbred lines of either parental form, while the latter in their turn were more virulent than the interspecific hybrids. In general, on the sorghum varieties susceptible to one inbred parent and resistant to the other, both intra- and interspecific $F_1$ chlamydospores proved to be intermediate in their virulence. On kafir × feterita (H.C. 2423), the interspecific hybrid arising from a cross of form 3 of *S. sorghi* with *S. cruenta* was only slightly less virulent than either parent. Spur feterita (C.I. 623) was immune in all the pathogenicity tests.

Uppal (B. N.) & Desai (M. K.). **Physiologic specialisation in Sclerospora graminicola (Sacc.) Schroet.**—*Indian Journ. Agric. Sci.*, ii, 4, pp. 667–678, 1 pl., 1932. [Received April, 1933.]

This is the full report of the authors' study of physiological

specialization in *Sclerospora graminicola*, an abstract from which has already been noticed [*R.A.M.*, x, p. 517; cf. also xi, p. 634].

PARK (M.). **Citrus canker.**—*Trop. Agriculturist*, lxxx, 2, pp. 124–125, 1933.

A brief account is given in popular terms of the symptoms of citrus canker (*Pseudomonas citri*) [*R.A.M.*, x, pp. 80, 786], which in Ceylon attacks all varieties growing at altitudes under 3,000 ft.; localities where the rainfall is evenly distributed throughout the year suffer most. Mandarin [*Citrus nobilis* var. *deliciosa*] is probably the most resistant variety, grapefruit being susceptible. The control measures recommended consist in removing and burning all infected material, cutting back to the healthy wood, and spraying weekly in wet, and fortnightly in dry, weather. If possible, the trees should be protected by windbreaks.

**State Plant Board of Florida. Report for the period July 1, 1930–June 30, 1932 (Ninth Biennial Report).**—42 pp., 1933.

Up to 30th June, 1932, the total number of properties in Florida that had been found infected by citrus canker [*Pseudomonas citri*: *R.A.M.*, vii, p. 287; x, p. 643] was 515, none of which, however, is now in an active state of infection or requires placing under full or partial quarantine. The total number of grove trees found infected between 1st May, 1914 and 30th June, 1932 was 15,243 and the total number of 'exposed' grove trees destroyed during the same period, 242,502. The number of infected nursery trees amounted to 342,260 and the number destroyed to 2,740,850. No new infections have been found since November, 1927.

BRITON-JONES (H. R.). **The control of scab disease (Sporotrichum citri Butler) in the British West Indies.**—*Trop. Agriculture*, x, 2, pp. 40–42, 1933.

The results of experiments [details of which are given] made in 1932 in Trinidad showed that in sour orange [*Citrus aurantium* var. *bigaradia*] seedlings badly affected with scab (*Sporotrichum citri*) [*R.A.M.*, xii, p. 166], which were planted at the beginning of August, some under shade and some exposed to the sun, the incidence of the disease in the middle of October was 67·5 per cent. in the plots exposed to full sunlight and 33·6 per cent. in plots that were artificially shaded, and was 73 and 16 per cent., respectively, at the end of November. The disease injures the apical buds and frequently necessitates the training of a more vigorous lateral shoot into a new leader in order to produce a single stemmed plant suitable for budding, the other shoots being trimmed off. The percentage figures for the disease were determined from the number of plants requiring this trimming. In the author's experiments the shaded plots were covered with coco-nut leaves supported by wooden uprights and bamboo cross-pieces at a height of 4·5 feet above the ground, but in another test very good results were obtained by growing the seedlings in the shade afforded by Guatemala grass (*Tripsacum laxum*), and several local planters are successfully using various other plants as shade in the control

of scab in their sour orange nurseries. It is recommended to use such shade plants as can be ratooned, since the shade should be thinned out about a month before budding is done, after which it should be reduced to a minimum so as to allow the growth of young trees which will not suffer a serious set-back when transplanted into their permanent position in the citrus groves.

The experiments also indicated that shade is equally effective in the control of leaf spot (*Colletotrichum zingiberis*) [ibid., xi, p. 545] of ginger.

JOHNSTON (J. C.). **Zinc sulfate promising new treatment for mottle leaf.**—*California Citrograph*, xviii, 4, pp. 107, 116–118, 5 figs., 1933.

Owing to the success of the application of zinc in the control of the little leaf disease of deciduous fruit trees [*R.A.M.*, xii, p. 205] and the fact that certain types of mottle leaf of citrus [ibid., xi, p. 570] are associated with little leaf symptoms in California, 18 navel orange trees showing on an average 78 per cent. mottle leaf were treated in November, 1931, by spreading 5 to 30 lb. zinc sulphate round the trunks in circles 1 to 8 ft. in radius, 18 adjacent trees showing an average of 63 per cent. mottle leaf being kept untreated. By November, 1932, the treated trees averaged 13·6 per cent. mottled leaves and the untreated 42 per cent. The general effect of the treatment was to restore the foliage to normal where sufficient material was applied.

Similar applications (2·5 to 20 lb., radius 1 to 4 ft.) made to badly affected lemon trees (also suffering from die-back) greatly increased leaf area and, on an average, increased the size of the trees by 50 per cent., most of the trees putting out new growth for the first time. An application of 20 lb. zinc sulphate severely injured one tree.

On a third plot, consisting of Valencia oranges which for 12 years had shown a slow decline, mixed with plums showing 100 per cent. little leaf, applications of 40 and 20 lb. zinc sulphate per tree gave highly satisfactory results, 15 lb. gave some response, and even 2 lb. when applied in a 6-in. radius gave perceptible, if slight, improvement.

Treatment by inserting zinc sulphate crystals into the trunk or by spraying with various mixtures containing zinc proved less satisfactory.

SACCHETTI (M.) & EMILIANI (E.). **La fermentazione citrica del saccarosio coll'Aspergillus niger v. Tiegh. (Nota preliminare).** [The citric fermentation of saccharose by *Aspergillus niger* v. Tiegh. (Preliminary note).]—*Indus. Sacc. Ital.*, xxvi, 2, pp. 45–49, 1933.

From rotten lemons the writers isolated a strain of *Aspergillus niger* which is capable of transforming sucrose into citric acid with a yield of 40 per cent. This particular strain is much more active than the strains of *Citromyces* and *Aspergillus* hitherto known as citric-acid producers [*R.A.M.*, iv, p. 52; xi, p. 119]. The activity of the fungus is promoted by phosphates and magnesium salts, but an excess of nitrogen is detrimental.

STAHEL (G.). **Verslag van den Directeur.** [Report of the Director.]—*ex* **Verslag over de jaren 1931 en 1932.** [Report for the years 1931 and 1932.]—*Dept. Landbouwproefstat. Suriname,* pp. 5–34, 1933.

The following items of phytopathological interest occur in this report. The outcome of H. G. Bünzli's experiments in 1931, and those of the writer in 1932, in the transmission of the sieve-tube disease (phloem necrosis) of coffee by the coccid, *Rhizoecus coffeae,* failed to justify the supposition that the flagellates [*Leptomonas vasorum*] are conveyed by its agency from infected to healthy trees [*R.A.M.*, xi, p. 637]. It was further found, by the examination of cross sections of the proboscis of *R. coffeae* and another root coccid, *Ortheziopoda reynei,* that the bore of the tube of the stylet measures only 0·20 to 0·25 $\mu$ in width and would, therefore, not accommodate even the smallest specimens of *L. vasorum.* Contrary to expectation, it thus appears highly improbable that these coccids play any part in the dissemination of the sieve-tube disease. Similar tests are in progress with two species of bugs with stylet tubes 4 $\mu$ in width; the occurrence of these insects on the roots and collar is, however, much less constant than that of the coccids.

At the time of the first epidemic of witches' broom [*Marasmius perniciosus*] of cacao in Surinam about 1900 [ibid., xi, p. 703], it was thought in certain quarters that the infection had spread from the similarly affected wild *Eugenia latifolia* trees growing along the trenches in the plantations. However, it has now been ascertained that the witches' brooms of the wild plant are caused by a bacterium, *Pseudomonas hypertrophicans,* and have no connexion with the cacao disease.

In the Coronie district 747 coco-nut palms were eradicated in 1931 and 592 in 1932 in the official campaign against bud rot [*Phytophthora palmivora*], bringing the total number thus destroyed since 1918 to 24,707 [ibid., iv, p. 723].

COLEMAN (L. C.). **Report of work on the Coffee Experiment Station, Balehonnur, for the years 1930 and 1931.**—*Mysore Coffee Exper. Stat. Bull.* 8, 31 pp., 3 figs., 2 plans, 1932.

In this report on the work of the Balehonnur Coffee Experiment Station, Mysore, India, it is stated that the chief coffee diseases in southern India are leaf disease [*Hemileia vastatrix*: *R.A.M.*, xi, pp. 368, 636; xii, p. 286], black rot [*Corticium koleroga*: ibid., x, p. 239], die-back [ibid., xi, p. 368], and root rot [*Fomes noxius* and *Rosellinia* sp.: ibid., xi, p. 367].

Spraying tests [by W. W. Mayne] indicated that the most satisfactory combination of spreader and fungicide against coffee diseases is casein-Bordeaux, linseed oil-Bordeaux presenting certain practical difficulties in the field and being (at 20 oz. per 50 galls.) more expensive and slightly less effective. In 1931–2 the yield per acre of 1,200 plants sprayed with casein-Bordeaux was 3,051 lb. as against 2,835 lb. and 2,658 lb. for linseed-Bordeaux 20 and 10 oz. per 50 galls., respectively. Resin-Bordeaux gave only 2,575 lb., and Burgundy mixture with fish oil-resin soap adhesive only 1,806 lb., as against 2,182 lb. for Bordeaux mixture even without an adhesive. Leaf counts demonstrated that both pre- and post-

monsoon applications are required and that there is little, if any, difference in effectiveness between full strength and half-strength mixtures, so that it is considered that 0·5 per cent. Bordeaux mixture will probably be effective.

Excluding the labour cost for transporting water from a stream or tank (estimated at from 12 annas to 1 rupee 4 annas per day) [1 rupee = 16 annas = 1*s.* 6*d.* at par], the expense of the labour necessary to work a Drake and Fletcher D.S.P. sprayer, using two pumps at one centre and applying 1,000 galls. to 2½ acres per day, amounted to a little more than 2 rupees 3 annas per acre, as compared with Rs. 2–10 for a Holder Power Sprayer covering 3 acres with 1,200 galls. per day, and giving a better spray: the daily fuel consumption of the power machine cost Rs. 2–15⅓. The labour cost per acre of 8 two-gallon hand sprayers together covering 1 acre per day was slightly over Rs. 4–3. Taken together, the costs of labour and spray mixture for the power machine, the D.S.P. sprayer, and the 8 hand sprayers amounted, respectively, to Rs. 16–8, 16–1, and 18–1 per acre when 1 per cent. Bordeaux with casein was used and to Rs. 10–4, 9–14⅓, and 11–13⅓ when 0·5 per cent. solution was used. The amount of mixture needed to cover an acre varies greatly with the kind of coffee bushes to be treated, but 400 galls. represents a fair average.

MAYNE (W. W.). **The function of spraying in Coffee crop production.**—*Planters' Chron.*, xxviii, 2, pp. 34–38; 3, pp. 53–56, 1933.

In this discussion of the respective advantages of spraying and improved cultivation in the control of coffee leaf disease [*Hemileia vastatrix*: see preceding abstract] in southern India, the author states that as the vigour of the fungus is largely determined by that of the host, cultivation and manuring cannot control the disease though they may assist the trees to bear infection if adverse climatic conditions do not prevail too long. Heavy shade, by reducing the assimilation of carbon compounds, checks the disease at the expense of the crop. Prolonged adverse climatic conditions prevail in certain districts in southern India, where one small area, for instance, showed in two consecutive years the loss by January of nearly all the leaf produced between April and October of the previous year. It was evident that the only factor limiting the disease was the number of available leaves. The disease must be fought by direct methods, but whether these are worth while economically in any given case must be determined by climatic considerations and the general suitability of the locality for coffee cultivation.

In attacks of black rot [*Corticium koleroga*] the governing climatic factors are more limited in time and distribution than they are with leaf disease. While their effects can to some extent be mitigated by such methods as burying mulch, 'centring' bushes, and reducing excessive shade, none of these gives such satisfactory control as spraying.

As both leaf disease and black rot cause most defoliation during the latter part of the south-west monsoon and the period following, when the bushes are accumulating reserves for blossom-bud differen-

tiation, these diseases exercise a direct effect on crop. Further, any available reserves are liable to be consumed in the production of fresh leaf, with consequent depletion of the plant and inability of the new leaf to make up the necessary surplus of carbon compounds. The increase in crop which results from spraying is directly due to the conservation of the plant's carbon-compound manufacturing apparatus, enabling it to function successfully through the moist, sunny months of the latter part of the year, storing up reserves utilized in developing fruit buds. Taken as a whole, the effects of manuring in southern India are of a much lower order than those obtained by spraying to increase the healthy functional leaf area. In some cases in coffee cultivation protection against disease the fundamental cultural problem.

Manuring, except perhaps on very old estates, and in special cases, should be regarded as an insurance against deterioration and not, as at present, as a direct means of increasing crop on estates where control methods have recently been instituted. Manuring with reference to the minerals removed by the average crop is the best method of maintaining the mineral food level in the soil.

PICADO (C.). **Fusarium disease of Coffee in Costa Rica.**—*Journ. Dept. Agric. Puerto Rico,* xvi, 4, pp. 389–400, 4 pl., 1932.

Coffee plants attacked by the *Fusarium* disease recently reported from Costa Rica [*R.A.M.*, xi, p. 369] yield progressively less every year. The affected plants fail to renew growth on the onset of the spring rains and any new shoots formed die and turn charcoal-black, or if they remain green, cease growing and bear abnormal leaves and twigs. In abandoned fields the tops are dead and there is a growth of thin unproductive branches underneath. At present the crop in the affected area is reduced by about 25 per cent. Cultures of the causal organism may be nearly white, or orange, deep vermilion or violaceous red. After two days, especially in the red colonies, unicellular conidia measuring 6 by 3 $\mu$ were produced, the white colonies giving 2-, 3-, or 5-septate conidia with curved ends, measuring 40 by 4 $\mu$. Old mycelium ground up after being grown in Richards's solution emitted a characteristically acrid odour.

On the host the sporodochia, which generally arose behind the leaf scars, produced either micro- or macroconidia. The conidiophores usually had four segments and, if short and thick, usually bore ovoid microconidia averaging 7 by 3 $\mu$ in diameter. The macroconidia formed on the host were almost straight except for the curved ends and averaged 40 by 4 $\mu$. Some 6- or 7-septate spores measured 60 by 7 $\mu$. Intercalary, spherical, rarely elliptical chlamydospores were usually formed in sugar-agar plates and old carrot slants. The fungus is regarded as an undescribed species of *Fusarium* and is named *F. anisophilum.*

What is considered to be the perfect stage of *F. anisophilum*, a *Nectria* named *N. anisophila* n. sp., was found in lesions on diseased shade trees. It is characterized by deep orange (almost vermilion) perithecia arranged singly or in colonies and measuring 270 to 340 $\mu$ in diameter. The cylindrical asci measure 70 to 90 by 12 to 14 $\mu$ and contain eight hyaline, smooth, elliptical or

fusoid, 1-septate, uniseriate spores measuring 14 to 15 by 6 to 7 $\mu$; filiform, branching, twisted paraphyses also occur. The conidial stage of *N. anisophila* reproduced completely the cultural and pathogenic reactions of *F. anisophilum*. Ascospore cultures of *N. anisophila* reproduced the perfect stage when grown on coffee shoots in a damp chamber, provided the source was *Inga* trees, but subcultures from living coffee inoculated with *N. anisophila* failed to produce perithecia when grown on coffee shoots in a damp chamber. By passing through the coffee plant the fungus loses its ability to produce its perfect stage.

Direct inoculations of coffee leaves and branches were unsuccessful. Inoculations into thick roots of old trees also failed, though later on the fungus reached the finer roots through the soil and caused infection. Uninjured seedlings in the cotyledonary stage grown in inoculated soil in pots did not contract the disease, but other similar ones punctured at the collar were greatly retarded in growth. One-year-old plants similarly grown were immediately attacked, whether wounded or not, the fungus destroying the cortex from the base of the stem upwards. At 18° to 22° C. such plants remained apparently healthy for at least five months, but when taken outdoors (45° in the sun) they began to lose their leaves in about five weeks, by which time the cortex of the branches had begun to dry. A field test showed that the fungus spread rapidly through the soil and attacked two-year-old plants.

Lima beans [*Phaseolus lunatus*] near an inoculated plot were attacked, and a natural infection occurred on a *Poinciana regia* tree under which diseased wood was piled. On coffee shade trees lesions and symptoms resembling those on coffee were noted, and *F. anisophilum* was isolated from affected roots and branches. *N. anisophila* was found in the dead branches of *Gliricidia maculata*, *Inga* sp., and *Erythrina* sp.

The spread of infection is due to neglect of pruning and to piling up the waste wood (when the trees are pruned) in or near the coffee plantations. Once the soil becomes infected the fungus attacks the small rootlets, and in poor soils where root development is feeble even slight infections are disastrous. Recommendations are made for the pruning and burning of all diseased wood and avoidance of the use of susceptible shade trees in new plantings.

**Reports received from Experiment Stations, 1931–1932.**—173 pp., 1 pl., 44 graphs, 2 plans, London, Empire Cotton Growing Corporation, 1933.

This compilation of the reports for the season 1931–2 received from various cotton-growing stations in the British Empire [cf. *R.A.M.*, xi, p. 450] contains, among others, the following items of phytopathological interest.

The alternative hosts and insect vectors of internal boll disease in South Africa [associated with *Nematospora gossypii* and *N. coryli*: ibid., x, p. 519] were investigated, and it was ascertained that early in the season (December to January) ratoon cotton showed considerable staining before any species of *Dysdercus* appeared. Apparently, infection is carried by a number of Heteroptera, largely Pentatomidae, for the other hosts of which (known

to include several Leguminosae) search is being made. In North-Western Rhodesia the injury done by species of *Dysdercus* is stated to be the limiting factor in establishing cotton as a commercial crop. The Pentatomid *Callidea dregei* was present in considerable numbers, but as compared with the stainers was of minor importance as a carrier of internal boll rot [*Nematospora* spp.]

At Shambat (Sudan) little blackarm [*Bacterium malvacearum*: ibid., xii, p. 91] developed, the cotton finally attaining a greater height than in the previous year. Leaf curl was sporadic and slight, but two infections (believed to be the first records on this type) were observed on Asiatic cottons. At the research farm in the Gezira area nearly 90 per cent. leaf curl was present, but here also individual plants were less severely attacked than usual; the control rows of Sakel averaged 85 per cent. infected plants, as compared with only 8·5, 13·5, and 15·5 per cent. for Shambur IV, X.H. 1029, and X.H. 1229, respectively.

In experiments in Uganda it was found that seed treated with sulphuric acid gave the least primary infection with *Bact. malvacearum* [see above, p. 421]. There was no difference between the amount of primary infection that developed in plants from untreated seed and from seed dusted with a mercury compound, though the same dust gave a higher initial germination than any other treatment. The highest primary infection followed steeping the seed in a strong emulsion of *Bact. malvacearum*. By the time secondary infection appeared there was no longer any real difference between the effects of the various treatments.

At Domira Bay, Nyasaland, stainer was present in sufficient quantity to cause a bad outbreak of internal boll disease [*Nematospora* spp.], but the amount of stained cotton was negligible.

At Sigatoka, Fiji, *Bact. malvacearum* appeared in March, causing much boll rot in some fields [ibid., viii, p. 510]; Shambur IV and Sea Island varieties were those most affected, New Guinea Hybrid showing partial resistance.

MAHALANOBIS (P. C.) & BOSE (S. S.). **Statistical notes for agricultural workers. No. 5. A note on the variation of the percentage infection of wilt disease in Cotton.**—*Indian Journ. Agric. Sci.*, ii, 4, pp. 704–709, 1932. [Received April, 1933.]

The statistical study of the results obtained in 1931 by Kulkarni in experiments to determine the bearing of the date of sowing of cotton on the relative incidence of wilt [*Fusarium vasinfectum*: *R.A.M.*, viii, p. 309] in the ensuing crops showed distinctly significant differences in mean percentage infection of the plots sown in June (20·10) and in August (13·87), respectively; the difference between the June and July (15·57) plots was on the verge of significance, but that between the July and August plots was practically insignificant. The general trend was to show more wilt in the earlier plots.

NEAL (D. C.) & WESTER (R. E.). **An undescribed sclerotium fungus prevalent in northeast Texas.**—Abs. in *Phytopath.*, xxiii, 1, p. 24, 1933.

Decayed cotton stalks and roots a few inches below soil level at

Greenville, Texas, were found, following a wet period in September, 1932, to bear white to pale yellow, ovoid or ellipsoid, smooth sclerotia, measuring 5 by 1 mm. and formed of anastomosed hyaline hyphae; they developed on mycelial strands similar to those of *Phymatotrichum omnivorum* though finer in texture, and were variously constricted and often forked at the strand connexions. The mycelium is septate and branching, and certain new cells arising from the side of a parent hypha tend to grow in opposite directions. Pending further investigations, the name *Ozonium texanum* n. sp. is proposed for the fungus.

GRIMES (M.), CUMMINS (H. A.), & KENNELLY (VIOLET C. E.). **Étude des champignons trouvés dans le lait, la crème et le beurre.** [A study of the fungi found in milk, cream, and butter.]—*Le Lait*, xii, 119, pp. 894–903; 120, pp. 1071–1079, 1932; xiii, 123, pp. 291–307, 4 pl., 1933.

This is a French version of the authors' accounts of the fungi isolated by them from milk, cream, and butter in Ireland, the English text of which has already been noticed [*R.A.M.*, ix, p. 185; x, p. 241].

ALMEIDA (F. P. de). **Contribuição para o estudo da morphologia do Coccidioides immitis nos tecidos parasitados.** [A contribution to the study of the morphology of *Coccidioides immitis* in parasitized tissues.]—*Ann. Fac. Med. São Paulo*, vii, pp. 117–123, 3 pl., 1932. [English translation.]

Attention is drawn to the occurrence of some peculiar morphological structures in two cultures of *Coccidioides immitis* [*R.A.M.*, xii, p. 288 and next abstract] from the United States used by the writer for inoculation experiments on guinea-pigs, on which they proved to be uniformly fatal. In one of these an active formation of endospores was found 25 days after inoculation, and material containing the parasite was preserved sealed off from air. A year later some of the cells containing endospores showed fine, short filamentous processes radiating into the surrounding matrix. The processes were up to 5 to 10 $\mu$ in length and were sometimes present throughout the periphery of the cell and in other cases limited to certain areas. The cells bearing these processes were about 45 to 55 $\mu$ in diameter, excluding the capsule.

ALMEIDA (F. P. de). **Considerações em torno do Coccidioides immitis e do Pseudococcidioides mazzai.** [Some reflections on *Coccidioides immitis* and *Pseudococcidioides mazzai*.]—*Ann. Fac. Med. São Paulo*, viii, pp. 83–91, 10 pl., 1932. [English translation.]

The results of the author's comparative studies on *Coccidioides immitis* and *Pseudococcidioides mazzai* in Brazil, in which it is concluded that the latter is a synonym of the former, have already been summarized from another source [*R.A.M.*, xi, p. 782].

MOORE (M.). **Blastomycosis: report of a case, with a study of an etiologic factor and a classification of the organism.**—*Ann. Missouri Bot. Gard.*, xx, 1, pp. 79–118, 2 pl., 1933.

The history of blastomycosis is outlined and its etiology, clinical

manifestations, and differential diagnosis discussed in connexion with a case in a 43-year-old farmer recently treated by the writer. The organism isolated from lesions on the patient's left arm and hand was grown on a number of standard media [its characters on each of which are described], and found to correspond with Gilchrist's *Blastomyces dermatitidis* [*R.A.M.*, xii, p. 23]. Supplementary observations, however, revealed the inclusion of asci and ascospores in the life-history of the fungus, which is accordingly transferred to the Endomycetaceae [cf. next abstract] as *Endomyces dermatitidis* n. comb., with a revised diagnosis in English. The organism is characterized by budding, yeast-like cells 7 to 12 $\mu$ in diameter and up to 20 $\mu$ in length, occurring singly or in groups of two to four. On agar media septate, thin-walled hyphae form and bear laterally, usually near a septum, numerous piriform or round, pedunculate or sessile conidia measuring about 5 $\mu$ in diameter. Racquet hyphae also occur, the broad part ranging from 3 to 6 $\mu$ in diameter. The terminal, lateral, or intercalary chlamydospores measure 12 to 15 by 5·5 to 7·5 $\mu$, or 7 $\mu$ in diameter when round. The development of asci was observed in cultures, preceded by the fusion of two terminal cells from the ends of the main hyphae or of lateral branches. This resulted in the formation of a spherical, thick-walled ascus measuring 8 to 13 $\mu$ in diameter and containing eight spherical to ovoid, smooth, hyaline to pale chamois-coloured spores, 2 to 3 $\mu$ in diameter. The colonies are white at first, turning cinnamon to brown with age.

An eight-page bibliography is appended.

MacBryde (C. M.) & Thompson (E. I.). **Meningitis and dermatitis caused by a new variety of Blastomycete (Endomycete.)**—*Arch. of Dermatol.*, xxvii, 1, pp. 49–69, 4 figs., 1933.

Full clinical details are given of a fatal case of meningitis in a young man who had been suffering for the previous three years from a so-called blastomycetic dermatitis. This is believed to be the first record of the kind. The organism isolated from the spinal fluid, urine, and blood was identified as a new variety (*isabellina*) of *Endomyces capsulatus* [*R.A.M.*, ix, p. 34], its morphological and cultural characters being described at length. The hyphae vary considerably in diameter on different media; chlamydospores measuring 11 by 5 $\mu$ develop from a racquet mycelium; the piriform, sessile conidia measure 6 by 5 $\mu$, and the eight-spored asci 5·5 to 12 $\mu$ in diameter. The organism forms chamois- or pale isabella-coloured colonies on Sabouraud's agar. It was pathogenic to rabbits, guinea-pigs, and mice.

Niño (F. L.). **Glositis blastomicética.** [Blastomycetic glossitis.]—*Prensa Med. Argent.*, xx, 7, pp. 361–371, 20 figs., 1933.

Details are given of a fatal case of glossitis in a 58-year-old male patient, accompanied by intestinal disorders resembling those of sprue. The causal organism [the morphological and cultural characters of which are described] was identified as *Monilia pulmonalis* [*R.A.M.*, xii, p. 218] or a very close relative.

Ota (M.) & Huang (P.-T.). **Sur les champignons du genre Pityrosporum Sabouraud.** [Note on the fungi of the genus *Pityrosporum* Sabouraud.]—*Ann. de Parasitol. Humaine et Comp.*, xi, 1, pp. 49–69, 2 figs., 1933.

The authors describe their studies of three strains of *Pityrosporum*, namely, (*a*) supplied to them by Acton and Panja from Calcutta [*R.A.M.*, vii, p. 325], (*b*) obtained from Castellani who in 1925 had described it under the name *Cryptococcus graciloides* [ibid., iv, p. 607], and (*c*) isolated by Huang from two different sources. On the ground of their morphological and cultural characters [which are described] all the three strains are considered to be true *P. ovale*. Inoculations into man all gave negative results, indicating that the fungus can scarcely be considered as the cause of pityriasis capitis; in mice it produced some minor microscopic lesions in the internal organs, but did not appear to be able to persist in them, since a number of inoculated mice survived a long time in apparent good health.

*P. ovale* is an anascogenous blastomycete closely related to *Cryptococcus* (= *Torulopsis* Berlese) [cf. ibid., viii, p. 677], but differs from the latter in some morphological and biological respects. A cursory review of the relevant literature shows that probably it was for the first time described by Rivolta in 1870 under the name *C. psoriasis*, a misleading binomial. The term 'spore' applied to it by Malassez in 1874 was changed in 1891 by Unna to 'Flaschen-Bacillus'. In 1884 Bizzozero described two varieties of the fungus under the names *Saccharomyces sphaericus* and *S. ovalis*, which were reunited by Oudemans as *S. capillitii*. According to Brumpt the generic name *Pityrosporum* was created by Sabouraud, who named Malassez's 'spore' *P. malassezi*, but the authors prefer to follow Brumpt in selecting Bizzozero's name *P. ovale* [1882], owing to its wide usage among dermatologists and mycologists. Benedek's *S. malassezi* is believed to be a yeast quite distinct from *P. ovale*.

Sampaio (N.). **Contribution à l'étude des dermatomycoses portugaises. Les teignes de Lisbonne.** [Contribution to the study of Portuguese dermatomycoses. The ringworms of Lisbon.] —*Ann. de Parasitol. Humaine et Comp.*, xi, 1, pp. 46–48, 1 pl., 1933.

In this paper the author gives an annotated list of the fungi isolated by him from 33 cases of human ringworm in Lisbon, among which 21 were due to *Trichophyton violaceum* [*R.A.M.*, xii, p. 218]. It also includes some observations on the behaviour of the organisms in culture.

Grigorakis (L.). **Sur un nouveau milieu de conservation des dermatophytes (pléomorphisme, caractère acquis, spécificité tissulaire).** [On a new medium for the conservation of the dermatophytes (pleomorphism, acquired characters, histological specificity).]—*Comptes rendus Acad. des Sciences*, cxcvi, 1, pp. 60–62, 1933.

The writer has found the following medium eminently satisfactory for the cultivation of certain dermatophytes: calf spleen

pulp 50 gm., agar 1·8 gm., peptone 1 gm., and water 100 c.c. On this medium at 28° C., *Arthrosporia* [*Achorion*] *schoenleini* developed much more profusely than on sugar and peptone agar, while *Spiralia radiolata* [*Trichophyton radiolatum*] not only grew more rapidly than on Sabouraud's medium but showed no trace of pleomorphism [*R.A.M.*, xi, p. 373]. Similar results were obtained with other species. The high content of the spleen in lipoids affords the organisms in question a similar type of nutriment to that derived from their parasitic activities.

Liebesny (P.), Wertheim (H.), & Wertheim (H.). **Über Beeinflussung des Wachstums von Mikroorganismen durch Kurzwellenbestrahlung. I. Mitteilung.** [On the influence of short-wave radiation on the growth of micro-organisms. Note I.] —*Klin. Wochenschr.*, xii, 4, pp. 141–145, 1933.

Out of eight human pathogens (fungi) exposed *in vitro* for 20 minutes to short-wave irradiation (150 milliamperes), only two were retarded in growth, viz., *Trichophyton gypseum* and *Achorion schoenleini*, the effect being more noticeable in the former. The development of several other human pathogenic fungi was considerably stimulated by irradiation.

The results of the tests (which further included a number of bacterial agents of human disease) are discussed in the light of their application to short-wave therapy.

Takasu (B.). **Über eine bisher noch nicht beschriebene Art von Trichophyton (Sabouraudites-Art von Ota und Langeron) und ihre Beziehungen zu Sabouraudites ruber (Bang), sowie Trichophyton coccineum.** [On a hitherto undescribed species of *Trichophyton* (*Sabouraudites*-species of Ota and Langeron) and its relationships with *Sabouraudites ruber* (Bang) and *Trichophyton coccineum*.]—*Japanese Journ. of Dermatol.*, xxxiii, 2, pp. 193–204, 18 figs., 1933. [Japanese, with German summary on pp. 37–39.]

In 1931, in Chugoku, Japan, the writer isolated, from the parietal region of a schoolboy affected by ringworm, a fungus culturally resembling *Trichophyton coccineum* [cf. *R.A.M.*, xi, p. 646] and morphologically closely related to *Sabouraudites ruber* [ibid., xii, p. 94].

The hyphae measured 4·5 to 5·5 $\mu$ in diameter and bore a few lateral spores, 4·5 $\mu$ in diameter; terminal or intercalary chlamydospores, racquet-shaped elements, and pluriloculate spindles, 20 to 40 $\mu$ in diameter, were also present in cultures on Sabouraud's agar. After 15 days the surface of the culture was covered with a fine, white down, the periphery being reddish brown. Inoculation tests on rabbits and on human patients gave positive results.

The fungus is considered to represent a transitional phase between *S. ruber* and *T. coccineum*, and the name proposed for it is *S. ruber* var. *yamaguchiense*. *T. coccineum* should also be regarded as a variety of *S. ruber*.

Schmidt (P. W.). **Über die Pilzflora Westfalens, insbesondere des Münsterlandes. (Beiträge zur Klinik besonderer Erkrankungsformen bei Pilzerkrankungen, sowie über**

**Doppelinfektionen mit verschiedenen Pilzarten, Züchtung von Mikrosporon audouinii aus dem strömenden Blute).** [On the fungus flora of Westphalia, especially of the Münster district. (Contributions to the clinical study of particular pathological types in fungous diseases, and also on dual infections with various fungus species and the cultivation of *Microsporon audouini* from the blood stream).]—*Arch. für Dermatol.*, clxvii, 2, pp. 418–447, 7 figs., 1933.

A list is given of the dermatophytes isolated from 546 patients examined at the Skin Clinic of Münster University, Westphalia, from 1925 to 1932 (first quarter). *Epidermophyton interdigitale* was found in 38·7 per cent. of the cases and *Achorion schoenleini* in 19, ten other species being less frequent. A species of *Cephalosporium* agreeing with that described by Benedek [ibid., viii, p. 783] was isolated from a number of miscellaneous pathological conditions, its part in the etiology of which is not clear. *Hemispora stellata* [ibid., x, p. 459] was isolated from a chronic ulceration of the nail-bed. Eight cases of dual infections with common dermatophytes are reported and clinical details are given of a number of cases, including two in which *M. audouini* was isolated from the blood stream.

Connor (J. I.). **Favus in mice and men.**—*Med. Journ. of Australia*, xix (ii), 26, pp. 765–767, 4 figs., 1932.

Details are given of the writer's recent investigation of an epidemic of favus affecting mice in the wheat-growing areas of Australia and spreading to the men working at the stacks. The fungus isolated from the lesions both on the mice and on the human subjects was identified as *Achorion quinckeanum* [cf. *R.A.M.*, ix, p. 314], which is believed to have been present at any rate since the similar epidemic in 1917–18, ready to reappear in a virulent form under suitable conditions.

Shaw (F. W.) & Wampler (F. J.). **Mouse favus.**—*Virginia Med. Monthly*, lix, 12, pp. 742–745, 6 figs., 1933.

In December, 1932, an epidemic of favus among mice broke out in a building at Richmond, Virginia, the top floor of which is used for the storage of grain and fodder. Possibly the fungus responsible for the disease (*Achorion quinckeanum*) [see preceding abstract] may have been introduced with shipments from a European country in which the condition is prevalent, either on the grain itself, on the straw used for packing glassware, &c., or on the skin of a mouse. The building in question is situated at least a mile and a half from the local wharf, and no infection has been found in any of the adjacent business houses. Previous literature on the subject of mouse favus is briefly reviewed.

Chavarria (P.) & Rotter (W.). **Die kolumbianische Piedra.** [The Colombian piedra.]—*Arch. für Schiffs- und Tropenhygiene*, xxxvii, 2, pp. 73–87, 16 figs., 1933.

Both *Trichosporum hortai* and *T. giganteum* were isolated in Costa Rica from the authors' twelve cases of 'piedra' of the hair from various parts of Colombia [*R.A.M.*, ix, p. 35]. *T. hortai* is

believed to be the actual agent of the disease, *T. giganteum* being regarded as an accidental contaminant of the cultures. Inoculation experiments on laboratory animals, however, have hitherto given negative results. A comparison of the writers' cultures with six from the Oswaldo Cruz Institute showed that the Colombian strains are identical with those of Brazil and Paraguay.

CARBONE (D.) & CANONICI (O.). **Contribution à la technique de l'agglutination des spores des 'Aspergillus'.** [A contribution to the technique of the agglutination of the spores of '*Aspergillus*'.]—*Boll. Sez. Ital. della Soc. Internaz. Microbiol.*, v, 1, pp. 20–21, 1933.

A technique devised by the authors to secure the agglutination of the spores of *Aspergillus niger* and *A. fumigatus* is briefly described. The spores are suspended in physiological salt solution, centrifuged, and then washed and centrifuged three times in acetone, after which the liquid is decanted and the spores are left to dry in the tube. Physiological salt solution is added, any spore masses are broken up with a glass rod, and filtering is effected through cotton. The suspension should consist of single spores or groups of not more than three, otherwise it must be filtered again. Next, 0·1 c.c. of the freshly prepared spore suspension, to which an equal quantity of the serum to be tested is added, is placed on a slide in an open Petri dish which is rocked gently for a few minutes. When agglutination occurs the spores collect in broad, flat, light masses.

Agglutination was obtained with normal serum, but at much higher concentrations than those (not over 1 in 120 to 1 in 140) required with specific sera.

NANTA (A.) & SENDRAIL (M.). **Reproduction expérimentale des incrustations sidérosiques observées dans les nodules de Gandy-Gamna.** [The experimental reproduction of the siderotic encrustations observed in the nodules of Gandy-Gamna.] —*Comptes rendus Soc. de Biol.*, cxii, 2, pp. 118–120, 1933.

The writers claim to have produced the characteristic siderotic encrustations (Gandy-Gamna nodules) [*R.A.M.*, vii, p. 633] in the spleen of dogs inoculated with *Aspergillus fumigatus*. The culture used in the particular case described was an old one from Biourge's laboratory at Louvain. Similar results have been obtained with *A. ntantae* [ibid., ix, p. 779], *A. tunetana* Langeron (which provoked acute splenomegaly), and *A. hortai* Langeron.

DAVIS (F. V.). **Some cases of mildew on silk-cellulose acetate materials.**—*Journ. Textile Inst.*, xxiv, 2, pp. T86–T89, 1933.

An inquiry into the cause of defective dyeing of many samples of cellulose acetate artificial silk fabrics, in which patches of lighter shade occur in the dyed material, showed that these patches yielded consistently more organisms than the normally dyed portions.

The cloth examined was crêpe composed of a cellulose acetate warp (gelatine sized) and a real silk weft. The organisms found were, in addition to several bacteria, two undetermined species of

*Penicillium*, *P. brevicaule*, and (to a limited extent) *Aspergillus niger* and a *Mucor*. Attention is directed to the extreme improbability of the spores, found in an active state after the fabrics had undergone degumming and dyeing, having been introduced subsequently to these processes.

The defect was reproduced on a small scale by storing inoculated silk yarn in contact with cellulose acetate yarn and dyeing the acetate, and on a large scale by weaving a mildewed crêpe weft across a cellulose acetate warp, storing in a damp place for six months, and dyeing.

It is concluded that although cellulose acetate is known to be resistant to the action of micro-organisms [*R.A.M.*, xi, p. 717], it is probable that the micro-organisms present on a silk weft may, either directly or through their metabolic products, affect the dyeing properties and hence the chemical composition of a cellulose acetate warp in contact with the silk. Probably, the gelatine size on the acetate warp favours this development by providing nutriment for the micro-organisms. A fabric of this description in the grey requires dry and not too prolonged storage.

SEVERIN (H. H. P.) & FREITAG (J. H.). **List of ornamental flowering plants naturally infected with curly top or yellows diseases in California.**—*Plant Disease Reporter*, xvii, 1, pp. 1–2, 1933. [Mimeographed.]

Fifteen species of ornamental flowering plants in 14 genera belonging to 11 families have been found naturally infected by curly top [see above, p. 424] in California. After exposure to infected plants, previously non-infective beet leafhoppers (*Eutettix tenella*) transmitted curly top to sugar beets from 11 of these species. The plants were distributed as follows: *Kochia scoparia* var. *trichophylla* (Chenopodiaceae), *Celosia cristata* (Amaranthaceae), *Mirabilis jalapa* (Nyctaginaceae), *Dianthus barbatus* and *D. caryophyllus* (Caryophyllaceae), *Pelargonium hortorum* (Geraniaceae), *Tropaeolum majus* (Tropaeolaceae), *Viola tricolor* var. *hortensis* (Violaceae), *Petunia hybrida* (Solanaceae), *Scabiosa atropurpurea* (Dipsacaceae); *Matthiola incana* and its var. *annua* (Brassicaceae), and four in the Compositae (including *Zinnia elegans* and *Helichrysum bracteatum*).

Three varieties of *Z. elegans* and *H. bracteatum* were further observed to be affected by yellows, which was transferred by leafhoppers (*Cicadula divisa*) [*C. sexnotata*], after feeding on diseased plants, to healthy asters and celery [*R.A.M.*, xii, p. 136].

FREITAG (J. H.) & SEVERIN (H. H. P.). **List of ornamental flowering plants experimentally infected with curly top.**—*Plant Disease Reporter*, xvii, 1, pp. 2–5, 1933. [Mimeographed.]

The curly top disease of sugar beets was experimentally transmitted in the greenhouse by the leafhopper, *Eutettix tenella*, to 90 species of ornamental flowering plants in 72 genera belonging to 33 families [see preceding abstract]. A list is given of the artificially infected plants from which previously non-infective leafhoppers recovered the virus and transmitted it to sugar beets,

including *Humulus japonicus, Reseda odorata, Vinca rosea, Salvia splendens, Phlox drummondi, Lobelia cardinalis, L. erinus, Papaver nudicaule, P. orientale, Anemone coronaria, Delphinium nudicaule, Primula* (three species), *Digitalis ambigua, Cucurbita pepo, Lagenaria leucantha, Luffa cylindrica, Trichosanthes anguina, Nicotiana alata, Bellis perennis, Calendula officinalis,* three species each of *Cosmos, Centaurea,* and *Chrysanthemum,* and *Tagetes erecta.*

GRIEVE (B. J.). **Rose diseases and their control.**—*Journ. Dept. Agric. Victoria,* xxx, 11, pp. 553–556, 2 figs., 1932; xxxi, 2, pp. 101–104, 1933.

These final instalments of the author's series of papers on rose diseases throughout the world [*R.A.M.*, xi, p. 784] deal with *Gnomonia rubi*, reported from England [ibid., iv, p. 417], *Botryosphaeria dothidea* (Europe) [ibid., vi, pp. 487, 488], infectious chlorosis or mosaic (North America) [ibid., xi, p. 374], *Eurychora rosicola* (Brazil) [ibid., vi, p. 488], *Hendersonia rosicola* (Brazil) [loc. cit.], *Cryptosporium minimum* (Germany) [ibid., viii, p. 546], *Phoma oleandrina* (France), *Stereum purpureum* (England) [ibid., iii, p. 343; v, p. 502], *Kuehneola rosae* (Japan), *Gloeosporium rosae* (a nomen nudum) [ibid., vi, p. 488], anthracnose (United States) due to *Sphaceloma* [*rosarum*: ibid., xii, p. 96], *Stilbella* sp. on twigs in Trinidad, red rust (*Cephaleuros mycoidea* or *C. parasiticus*) in the West Indies, leaf bronze in England and America, and *Verticillium* wilt (probably *V. ovatum*) in Canada [ibid., xi, p. 245]. The last paper concludes with a brief note on the preparation of the copper and sulphur fungicides commonly used against rose diseases.

LAUBERT (R.). **Die Botryosphaeria-Krankheit (Schwarzschorf) der Rosen.** [The *Botryosphaeria* disease (black scurf) of Roses.]—*Die Kranke Pflanze,* x, 2, pp. 24–25, 1 fig., 1933.

From a well-known rose-garden at Sangerhausen, Germany, the writer recently received specimens of *Rosa alba* and its varieties attacked by black scurf (*Botryosphaeria dothidea*) [see preceding abstract], the importance of which is stated not to be generally realized. The fungus is capable of infecting healthy stems without producing conspicuous injury, but death ensues after four or five years. On the green cortex the lesions appear as round, slightly concave, rugose, black, scattered or confluent areas about ½ to 2 cm. in diameter. In England the Caroline Testout and Soleil d'or varieties are reported to be particularly susceptible. Control measures should be based on the removal of diseased material and the exclusion of susceptible varieties, possibly supplemented by the use of a fungicide.

PAPE (H.). **Krankheiten und Schädlinge der Begonien.** [Begonia diseases and pests.]—*ex* **Die Begonien ihre Beschreibung, Kultur, Züchtung und Geschichte.** [The description, cultivation, breeding, and history of Begonias.]—pp. 149–186, 13 figs., Stuttgart, E. Ulmer, 1933.

Semi-popular notes are given on the symptoms and control of

the following diseases affecting begonias in Germany and elsewhere: propagation disease, associated with *Pythium de Baryanum* [*R.A.M.*, xi, p. 718], *Moniliopsis aderholdi*, *Phytophthora omnivora*, *Thielavia basicola*, *Corticium vagum* [*C. solani*], *Botrytis cinerea*, and other organisms, several of which can also attack the mature plants [ibid., vi, p. 359]; root rot due to *Rosellinia necatrix* (recently reported from France); bacterial rot of the root collar (*Bacillus caulivorus*, a parasitic form of the common saprophyte *B. fluorescens liquefaciens* [ibid., xi, p. 18] occurring in France); crown gall (*Pseudomonas* [*Bacterium*] *tumefaciens*) [ibid., x, p. 79], from which *Begonia lucerna* appears to be immune; the slime fungus *Physarum gyrosum*, which overgrows the young plants though not a true parasite; leaf bacteriosis of the Gloire de Lorraine variety in Denmark [ibid., viii, p. 752]; rusts (*Coleosporium begoniae* and *Puccinia granularis*), the former in Mexico and Italy and the latter in South Africa; mildew (*Oidium begoniae*), reported from America and Denmark; leaf spots due to *Phyllosticta begoniae* (in France, Italy, Portugal, Germany, and Brazil), *Mycosphaerella begoniae* (Ecuador), *Gloeosporium begoniae* (Italy and North America), *Phyllachora begoniae* (Ecuador), *Cercospora* sp. (Germany and North America), and *Septoria* sp. (Germany); and stem rot of *B. argyrostigma* due to *Myxosporium sordidum* in South America and Europe.

Jones (L. R.) & Riker (Regina S.). **Two stem cankers of the China Aster.**—Abs. in *Phytopath.*, xxiii, 1, p. 20, 1933.

China asters in Wisconsin and Illinois were attacked in 1932 by *Phomopsis callistephi* [*R.A.M.*, v, p. 251], the disease caused by which may be distinguished from *Fusarium* wilt [*F. conglutinans* var. *callistephi*: ibid., xii, p. 175] by its cortical rather than vascular localization; its causation of a lateral canker on the aerial stem instead of a basal rot proceeding from the roots; and the production of abundant pycnidia on the diseased stem surface in the later stages. This disease was both prevalent and severe, attacking over half the plants of certain varieties. A species of *Botrytis* caused a stem canker of minor importance under excessively moist conditions.

Riker (Regina S.) & Jones (L. R.). **Fusarium strains in relation to wilt of China Aster.**—Abs. in *Phytopath.*, xxiii, 1, pp. 29–30, 1933.

The following results were obtained in tests of the pathogenicity of various European and Japanese strains of *Fusarium* from wilting asters in comparison with *F. conglutinans* var. *callistephi* Beach and Jackson (United States) [*R.A.M.*, xii, p. 373 and preceding abstract]. Pathogenicity was shown by *F. conglutinans* var. *callistephi*, *F. conglutinans* var. *majus* (two strains), *F. oxysporum* f. 6 (four strains), and *F. lateritium* var. *fructigenum* from Europe, and by three unidentified strains from Japan. The Wisconsin wilt-resistant aster varieties maintained their character towards the above-mentioned pathogenic strains.

Massey (L. M.), White (R. P.), & Jenkins (A[nna] E.). **Disease of cultivated sweet Violet caused by Sphaceloma.**—Abs. in *Phytopath.*, xxiii, 1, pp. 22–23, 1933.

Outdoor and greenhouse sweet violets [*Viola odorata*] were severely affected in New York in 1929, and in Pennsylvania in 1932, by an oedema-like disease previously reported from Georgia (1925–7). The stems, peduncles, and petioles may be conspicuously swollen and the leaves distorted. The lesions are generally whitish to vinaceous buff; on the stems, peduncles, and petioles they are linear to elongated, about 5 mm. long, raised or sunken; on the leaves roughly circular, first appearing as minute waterlogged areas, expanding to at least 3 mm. across, often raised on one surface and depressed on the other. The disease is caused by a *Sphaceloma* characterized by hyaline, later coloured, continuous or uniseptate conidiophores 9 to 12 by 2 to 4 $\mu$ in diameter, and hyaline or coloured, spherical to oblong-elliptical conidia, varying in size but often 3 to 7 by 2 to 3 $\mu$. On potato-dextrose agar after three weeks the colonies are raised, wrinkled, and almost black with a dark olive-buff border; on maize meal they are nearly smooth and ochre-red.

Hungerford (C. W.). **A new virus disease of Delphinium in Idaho.**—*Plant Disease Reporter*, xvii, 1, p. 5, 1933. [Mimeographed.]

Delphiniums in various parts of Idaho have been affected during the last two years by a disease of the witches' broom type, characterized by excessive proliferation of the flowering stalk which results in a bunched growth up to 18 in. in diameter. The leaves, petioles, and abortive inflorescences are much dwarfed, though some of the leaves may be extremely elongated. The diseased parts are generally paler than the rest of the plant, and the foliage shows irregular chlorotic areas, while necrotic streaks appear on the stalks and petioles. In the apparent absence of a causal organism the disease is tentatively attributed to a virus [cf. *R.A.M.*, vii, p. 18]. Good control was given by roguing and destroying infected plants.

Cappelletti (C.). **La flora fungina vivente sulle superfici stimmatiche delle piante alpine.** [The fungus flora living on the stigmatic surfaces of alpine plants.]—*Nuovo Giorn. Bot. Ital.*, N.S., xxxix, 4, pp. 690–692, 1932.

The author states that the stigmas of 28 species of alpine plants growing at altitudes between 1,300 and 2,300 m. were found to carry a varied fungal flora, the composition of which depended on the morphology of the floral parts and on the environmental conditions. Among the species of fungi that were isolated, 16 were identified, including *Fusicladium dendriticum* [*Venturia inaequalis*], *Fusarium* sp., *Alternaria tenuis*, and *Botrytis cinerea*, the last-named being only found in sunlit situations and never in shaded spots, except on *Veronica urticaefolia*. There was evidence that the dissemination of the fungi is chiefly effected by insects.

MONTEITH (J.). **A Pythium disease of turf.**—Abs. in *Phytopath.*, xxiii, 1, pp. 23–24, 1933.

*Pythium butleri* [*R.A.M.*, xi, p. 218] was isolated from diseased creeping bent [*Agrostis stolonifera*] turf at Rosslyn, Virginia, in 1926, and shown by greenhouse inoculations to be a vigorous parasite of various grasses, including *A.* and *Poa* spp. Affected patches, up to 4 in. in diameter, first appear blackened and water-soaked but soon shrivel and turn brown; they often coalesce and destroy large areas of turf. The disease has been reported on golf courses and lawns near Washington (D.C.), Philadelphia, St. Louis, Chicago, and elsewhere, being most destructive in hot, damp weather. *P. butleri* can attack plants over a wide temperature range, with an optimum at 35° C. Some degree of control was obtained by spraying the grass with mercuric chloride.

DAHL (A. S.). **Effect of temperature on brown patch of turf.**—Abs. in *Phytopath.*, xxiii, 1, p. 8, 1933.

Five years' observations in Arlington turf garden, Virginia, indicated that the occurrence of brown patch of turf (*Rhizoctonia* [*Corticium*] *solani*) [*R.A.M.*, xi, p. 246] varied directly with temperature. It occurred on 82 per cent. of the days with a minimum above 21° C. The sclerotia of some strains of the fungus were found to germinate at 8°, while all did so at 12° and 36°; the most rapid germination occurred at 28° or 32° and none took place at 40°. A temporary lowering of the temperature did not stimulate germination.

DAVIS (W. H.). **Snow mold and brown patch caused by Sclerotium rhizodes.**—Abs. in *Phytopath.*, xxiii, 1, p. 8, 1933.

Snow mould and brown patch of golf greens, lawns, and meadows are stated to be prevalent in New England, the former having also been reported from 15 States extending as far south as Virginia, west to Idaho, and north to Maine, as well as from Canada. The mycelium of the sclerotial type of snow mould, due to *Sclerotium rhizodes* [*R.A.M.*, xi, p. 499], caused the formation of brown patches. A non-sclerotial type of snow mould also occurred, but was not further studied. Both types generally appeared during the thawing of deep snow of long standing. An average of 175 sclerotia were formed on rhizomes over each square inch of one brown patch. In the field, the sclerotia germinated after a rest period of two months to a year; in the laboratory, stored dry, three months to two years. The mycelium that formed sclerotia was non-pathogenic, while that arising from germinating sclerotia was pathogenic.

FAES (H.), STAEHELIN (M.), & BOVEY (P.). **Les traitements effectués contre les parasites des arbres fruitiers, insectes et champignons en 1930 et 1931.** [The treatments carried out against the insect and fungous parasites of fruit trees in 1930 and 1931.]—*Landw. Jahrb. der Schweiz*, xlvii, 1, pp. 17–76, 26 figs., 5 graphs, 1933. [German summary.]

Better control of apple scab (*Venturia inaequalis*) was given by copper-containing preparations, such as fungan and cupromaag,

than by lime-sulphur, the former also being effective against pear scab (*V. pirina*). All apple varieties liable to contract storage scab should be given a late treatment (six weeks or a month before harvest) in addition to the three earlier ones (pre- and post-blossom and 15 to 20 days later). In March, 1932, the incidence of scab on fruit of the susceptible Franc-Roseau variety (healthy when stored) was only 3 per cent. from trees given five applications of Bordeaux mixture compared with 6 per cent. from those receiving two post-blossom and two late treatments and 50 per cent. where only two post-blossom applications were given.

Shot hole of cherries (*Clasterosporium carpophilum*) [*R.A.M.*, xi, p. 694] is amenable to control by two applications of Bordeaux mixture, care being taken not to exceed a strength of 1 per cent. copper sulphate for fear of injury to the fruit. If 2·5 per cent. lime-sulphur is substituted for Bordeaux mixture the number of applications must be increased.

Gooseberry mildew (*Sphaerotheca mors-uvae*) cannot be adequately combated by a dormant treatment with 1 per cent. formalin or 20 per cent. lime-sulphur, which should be supplemented by three applications of 2·5 per cent. lime-sulphur at fortnightly intervals during the growing period.

Notes are also given on the treatment of plum pockets (*Exoascus* [*Taphrina*] *pruni*), shot hole of peach (*E.* [*T.*] *deformans*), plum rust (*Puccinia pruni-spinosae*) [ibid., xi, pp. 559, 789], and *Monilia* of apricots [*Sclerotinia cinerea*: ibid., xi, p. 791].

Ricks (G. L.) & Toenjes (W.). **Success and failure in spraying for scab and codling moth.**—*Michigan Agric. Exper. Stat. Special Bull.* 230, 29 pp., 15 figs., 2 diags., 5 graphs, 1933.

In connexion with a study of the factors governing success and failure in spraying against apple scab [*Venturia inaequalis*] and codling moth [*Cydia pomonella*] in Michigan [*R.A.M.*, xii, p. 28], the writers describe the methods used and results achieved in scab control in 1929 by two growers whose orchards (consisting chiefly of Baldwins 22 to 28 ft. high) are situated three miles apart.

The spraying outfit used by grower No. 11 maintained a pressure of 250 lb., while that of No. 3 maintained one of 375 lb. Both growers used liquid lime-sulphur (2½ galls. per 100 of solution) and carried out the spraying operations (1) in the middle of April, (2) first week of May, (3) end of May to beginning of June, and (4) second week in June. Grower No. 3 allowed 17 galls. of solution per tree, while No. 11 gave only 12. The incidence of scab in the orchard of No. 3 was 2·94 per cent. compared with 58·06 in that of No. 11. Field notes taken during the course of the spraying operations showed that in No. 11 orchard the centre tops of the trees were not receiving a sufficient quantity of the fungicide. Early infection occurred on the new leaves in that portion of the trees and spread to the lower foliage and fruit with the dissemination of the spores at every rainy period. On the other hand, in orchard No. 3 all the exposed surfaces were well covered [cf. ibid., xi, p. 522]. Similar observations were made in other orchards, and the conclusion is reached that thoroughness of covering, rather than differences in the spraying schedule or

materials, is the primary factor in the success or failure of the campaign both against *V. inaequalis* and codling moth.

CHEAL (W. F.). **Apple scab spraying experiments in the Wisbech area. The times for application.**—*Journ. Min. Agric.*, xxxix, 11, pp. 993–999, 2 pl., 1933.

After a brief reference to previous work on the control of apple scab [*Venturia inaequalis*] in the Wisbech area of Cambridgeshire [*R.A.M.*, viii, p. 511], the author gives details of experiments in 1931 and 1932, the results of which showed that on the Worcester Pearmain variety three applications of lime-sulphur according to the schedule recommended by Marsh for the Bristol province [ibid., xi, p. 49] gave good control of the disease and produced high quality fruit. These results also demonstrate the importance of the additional pre-blossom application of the spray at the 'green flower' stage in the Wisbech area when lime-sulphur is used throughout, the results, even in such bad scab seasons as those of 1931 and 1932, indicating a marked superiority of scab control from two pre-blossom applications, at the green flower and pink bud stages, respectively, over that given when the former was omitted.

PERRAULT (C.). **The fire blight of Apples on the south shore of the lower St. Lawrence.**—*Twenty-third & twenty-fourth Ann. Repts. Quebec Soc. Protect. Plants, 1930–1932*, pp. 169–170, 1932. [Received May, 1933.]

Out of a total of 112 orchards on the south shore of the St. Lawrence, each containing 50 or more apple trees, 75 were recently infected by fireblight (*Bacillus amylovorus*) [*R.A.M.*, x, p. 737]. In some places the disease occurred in an extremely severe form, necessitating the eradication of a number of trees. Pears, mountain ash [*Pyrus* (?) *americana*], and hawthorn [*Crataegus* sp.] were also found to be infected [cf. ibid., x, p. 603].

STEVENS (N. E.). **United States of America: a survey of Apple rust in 1932.**—*Internat. Bull. of Plant Protect.*, vii, 2, pp. 28–29, 1933.

A recent survey by P. R. Miller and L. R. Fate in Pennsylvania, Maryland, Virginia, West Virginia, North Carolina, and Georgia showed that the rust of apple fruits caused by *Gymnosporangium germinale* is at least equally severe with that due to *G. juniperi-virginianae* [*R.A.M.*, xii, p. 100 and above, p. 423]. The former species, infection by which is restricted to the fruits, primarily affects the Winesap, Delicious, Arkansas Black, Stayman, Yellow Transparent, and Rome varieties, while the latter is most prevalent on Rome, Wealthy, York, Jonathan, Ben Davis, and McIntosh. In a well-cared-for commercial orchard in West Virginia the incidence of infection by *G. germinale* reached 10 per cent. The only other States in which this rust was found were Maryland and Virginia, whereas *G. juniperi-virginianae* was observed throughout the region inspected.

Shear (E. V.) & Cooley (J. S.). **Relation of growth cycle and nutrition to perennial Apple canker infection.**—Abs. in *Phytopath.*, xxiii, 1, p. 33, 1933.

Inoculations at two- to three-weekly intervals for a year with several strains of *Gloeosporium perennans* on apple twigs [*R.A.M.*, xii, p. 179] at Hood River, Oregon, caused infection in normal, living material during only a relatively short period in the autumn and early winter, the maximum infection (100 per cent.) occurring between mid-November and mid-December, after which there was a gradual decline. The internodes were less susceptible than the nodes. Trees receiving either an excess of nitrate or none were more susceptible to the canker than those in good vegetative condition.

Suit (R. F.). **Studies on a physiological spotting of Apples.**—*Twenty-third & twenty-fourth Ann. Repts. Quebec Soc. Protect. Plants, 1930–1932*, pp. 119–128, 3 pl., 1932. [Received May, 1933.]

In 1931 Fameuse and McIntosh apple fruits at the Oka Agricultural Institute, Quebec, were affected by a distinctive physiological spotting, which was accompanied by a slight reduction of the growth of the twigs and a plugging of the vessels of the roots with a brown substance. Cuttings from the diseased roots showed a diminution of vitality as compared with those from healthy ones, this effect being particularly noticeable in Fameuse. The spots, each of which was surrounded by a cork layer [cf. *R.A.M.*, ix, p. 434], did not spread within the tissues and after 225 days' storage at 40° to 45° F. the fruit was still sound. Chemical analyses showed that the diseased apples were less acid, more highly coloured, with more catalase, oxidase, and peroxidase, and a lower organic peroxide content than the normal fruit.

Cheal (W. F.). **Control of scab on Pears.**—*Gard. Chron.*, xciii, 2409, p. 139, 1933.

In 1932 one Fertility pear tree in a demonstration plot at Wisbech, Cambridgeshire, was left unsprayed while another was treated as follows against scab [*Venturia pirina*: *R.A.M.*, xi, p. 659]: pre-blossom (4th April) 8–8–100 Bordeaux mixture, and 26th April 1 in 30 lime-sulphur and nicotine; post-blossom (9th May) 1 in 40 lime-sulphur, and 17th and 31st May and 20th June, 8–8–100 Bordeaux mixture, 1 in 60 lime-sulphur, and 1 in 80 lime-sulphur, respectively. The conidia of the fungus were found to be emerging freely from wood pustules on 12th March, when the buds were bursting. On 1st May the sprayed tree displayed nearly double the amount of blossom seen on the untreated, while the total weight of the crop gathered in the third week of September was 74 lb., with 91 per cent. of absolutely clean fruit, compared with 7 lb. 10 oz. for the unsprayed tree, none of the pears from which was entirely free from injury.

VALLEAU (W. D.). **A virus disease of Plum and Peach.**—*Kentucky Agric. Exper. Stat. Bull.* 327, pp. 89–103, 9 figs., 1932. [Received April, 1933.]

During the past six or eight years plum trees at the Experiment Station, Lexington, Kentucky, have been dying from an unknown cause [*R.A.M.*, xii, p. 205]. The trees gradually weaken, and the young leaves are pale, narrow, and curled under in spring and chlorotic, though more normal in shape, throughout the summer. The larger branches die or make little growth, and vigorous water sprouts with an occasional leaf showing distinct patterns of the virus type sometimes grow from near the lower crotches.

The plum orchard adjoins a peach orchard where one Elberta tree since 1925 has annually produced a few 'bumpy' fruits with raised, dark red spots, and many leaves with indefinite chlorotic and necrotic markings. Bumpy fruits were found on other varieties also. Yellows [ibid., xi, pp. 521, 789] has been present in this orchard since 1925 and in 1928 it attacked a small block of peaches 200 yards away. The first fruits to show yellows also showed the 'bumpy' condition. In both orchards some trees produced an occasional bumpy fruit without showing yellows, suggesting that the two diseases may result from different causes and may both be present in the same tree.

Seedling peaches budded with affected plums developed chlorotic ring and line patterns on a few leaves, though their vigour remained unimpaired. Peaches budded with peaches showed no abnormal symptoms except when budded with trees known to be affected with yellows, in which case they developed typical yellows symptoms. These results demonstrated that some of the plum trees at least were affected with a virus transmissible to peach and distinct from the peach yellows virus. Further inoculations were made by budding, using eight varieties of affected plums and three of peach, two of which had yellows. Patterns subsequently appeared on the leaves of nearly all the peaches budded with three of the plum varieties and some of the trees budded with yellows material developed yellows. Buds from some plum varieties showing typical symptoms failed to produce patterns on peach leaves even when unions occurred, while a few patterns developed on peaches budded with a diseased plum variety on which no patterns were observed.

In a commercial orchard Abundance and Endicott plums budded on seedling peaches all showed leaves which were light green, narrow, and rolled downwards, like those at Lexington. Of 74 peach sprouts from the root-stocks examined in one row of the Abundance plums, 39 showed prominent ring and line patterns. In another block of budded trees in which the buds had been taken from the block previously mentioned the leaves of some of the Abundance trees showed prominent concentric yellow and green bands or large yellow areas, frequently visible 30 feet away; of 222 trees examined, 57 showed no leaf patterns and 89 and 76 faint and prominent ones, respectively.

Peach sprouts from the root-stocks of peaches budded with peach in the same nursery showed no patterns, but an occasional small leaf with distinct chlorotic ring and line patterns was found

in the trees. There was some evidence that the plum virus was present in certain peaches.

In budded peaches the virus was able to spread either up or down for at least three feet in eleven months, and it is considered that it probably spreads throughout the tree in that time.

A virus disease showing similar leaf symptoms to those seen on the plum trees was noted on four apple trees at Lexington. On three trees of one species the leaf symptoms were very marked throughout the season, and consisted of chlorotic rings and lines similar to those on peach, and of the same character as the ring spot patterns on tobacco leaves, except that no necrotic patterns were present. Patterns typical of the ring spot type of disease were also noted on one hybrid tea rose, hybrid perpetual roses, and a climbing rose over 12 years old.

The paper terminates with brief recommendations for the eradication of the virus from the nursery.

WILSON (E. E.). **Bacterial canker of Prunus spp. in California.**—Abs. in *Phytopath.*, xxiii, 1, pp. 36–37, 1933.

One of the two organisms associated with bacterial gummosis of plums in California [*R.A.M.*, xi, p. 310] agrees in most cultural and pathogenic characters with *Pseudomonas cerasi*, of which the other is apparently a variant differing only in size from *P. prunicola* described by Wormald from England [ibid., xii, pp. 227, 376]. The cankers of the disease, quiescent for most of the summer, resume activity in the autumn and continue to extend throughout the winter and early spring. The rate of expansion appears to depend, not only on temperature, but also (as indicated by inoculation tests) on the influence of the host itself.

LEHMAN (S. G.). **Bacterial twig and blossom blight of Raspberry.**—Abs. in *Phytopath.*, xxiii, 1, p. 21, 1933.

Young raspberry shoots bearing flowers and half-grown berries examined in 1932 had died back for distances of 1 to 4 in., presenting the general aspect of fireblight (*Bacillus amylovorus*) resulting from blossom infection on apple. The diseased tissues were light brown and exuded numerous white droplets, while some of the leaves showed marginal dead areas bordered by brown, water-soaked tissues containing bacteria. A bacterium isolated from the diseased flower stems proved pathogenic to raspberry and wild blackberry, but not to apple, while conversely an organism believed to be *B. amylovorus* from apple is innocuous to raspberry. Further studies on the relationship between the raspberry blight bacterium and the fireblight organism are necessary.

ANDERSON (H. W.) & KADOW (K. J.). **Anthracnose and gray bark of red Raspberries. Identification and control.**—*Illinois Agric. Exper. Stat. Bull.* 383, pp. 283–292, 7 figs., 1932. [Received May, 1933.]

In 1929 Latham red raspberries in Illinois were severely affected by an apparently new disease locally known as 'gray bark', which recurred in 1931. After the leaves fall in the autumn the canes show a pale grey discoloration, especially on the lower half and on

the south exposure. The grey areas are found, on closer inspection, to consist of numerous small, oval lesions which have fused; these are covered with the concentric, black acervuli of a fungus. The affected bark may be peeled off without any apparent injury to the cane. In the spring of 1932 typical anthracnose (*Plectodiscella veneta*) lesions were found on the fruiting laterals and young shoots. The fungus isolated from the grey bark lesions was found to correspond closely in morphological characters with *P. veneta*, though in cultures the two organisms showed considerable differences. Possibly the anthracnose fungus may comprise various strains. Cross-inoculation experiments on red and black Cumberland raspberries [*Rubus occidentalis*] with the grey bark and anthracnose organisms gave positive results. The grey bark phase of the disease (which is relatively innocuous) may be controlled by a single delayed dormant application of Bordeaux mixture (12–12–100) or lime-sulphur (1 in 12).

Tims (E. C.). **Stilbum cinnabarinum, the cause of a new Fig disease in Louisiana.**—Abs. in *Phytopath.*, xxiii, 1, p. 35, 1933.

Fig branches sent from Ascension Parish, Louisiana, in May, 1932, were covered with small, reddish-pink fungous heads, borne on short synnemata and consisting of masses of hyaline, unicellular conidia from which pure cultures were readily obtained. Inoculations made on young fig branches through wounds resulted in the formation of the typical heads 20 days later. The fungus rapidly spread through the woody tissues of the twig and into the pithy centre, killing a number of the twigs back to the two-year-old wood after 30 days. The causal organism of the twig blight, which was found to be widespread in the summer of 1932 on the Celeste variety in south-western Louisiana, has been identified as *Stilbum cinnabarinum*. Under normal conditions the disease appears to be of minor importance.

Simmonds (J. H.). **Banana leaf spot. Progress report.**—*Queensland Agric. Journ.*, xxxix, 1, pp. 21–40, 2 pl., 1 graph, 1933.

In the first section of this paper the author briefly describes and discusses the results obtained up to 1930 in experiments directed towards finding an adequate method for the control of the banana leaf spot (*Cercospora musae*) in Queensland [*R.A.M.*, viii, p. 255; x, p. 223]. None of the fungicides (mercuric chloride, copper sulphate, or formalin) tested for treating the banana suckers prior to planting had a detrimental effect on the subsequent growth of the plants, but none gave control of the disease, nor did repeated applications to the plants of copper carbonate-sulphur dusts in 1930, presumably owing to the lack of adhesiveness of the dust to the waxy and shiny surface of the leaves, and also to the heavy rains that occur normally during the summer and autumn months. The use of liquid sprays is beset with many practical difficulties in the majority of the Queensland plantations, chiefly because of the steepness of the slopes on which they are situated, and because of lack of a suitable water supply. Although no definite conclusions could be derived from the experiments as to the controlling efficacy

of stripping off the diseased leaves, there was some evidence that satisfactory results may be obtained, without entailing too much labour, by a thorough clean-up of the plantation after the new spring growth has started, followed by a new stripping of the plants in January or early February before the wet season sets in; besides all the spotted leaves, three or even four of the lower healthy ones should also be removed and destroyed. Observations at the Kin Kin Station on the varietal susceptibility of bananas to leaf spot indicated that both the Gros Michel and the Cavendish are markedly susceptible, while the Lady Finger and Sugar varieties appeared to be less affected; the Red Dacca appeared to be definitely resistant, but is of little commercial value at present.

In the second part details are given of a laboratory study of *C. musae*, which confirmed the findings of Campbell [ibid., vii, p. 225] in regard to its identity with the Fiji organism. Although no perfect fructifications developed on any of the culture media tested, dark pycnidium- or perithecium-like bodies, which remained sterile, were formed by most of the strains. In pure culture the optimum for growth appeared to lie between 25° and 26° C., with a maximum and minimum at 32° and 9°, respectively. The optimum for spore germination was about 29°; at lower temperatures, the germination period was lengthened, but after 48 hours a fair percentage of the spores germinated at as low as 15°. A preliminary test indicated that germination practically ceased below 80 per cent. relative humidity. These results are consistent with the rapid development of leaf spot during the early autumn months, when the average temperatures coincide with those favourable to the fungus. Artificial infection experiments showed that both surfaces of the banana leaf are equally susceptible to invasion.

Field observations indicated the existence of three stages in the development of the leaf lesions, which may be distinguished as (1) the early or streak stage, consisting of very light greenish-brown, somewhat indistinct, narrow streaks about 5 to 10 by 1 mm. or less in diameter (many of which, for some reason not yet understood, fail to develop further); (2) the brown stage, in which the spot expands laterally to become elliptical and turns first light and then dark brown to almost black; under favourable conditions spores may be formed when this stage is reached, and this is the only type of lesion on which spores may be expected to be found after the leaf has dried out; and (3) the grey centre stage, in which the elliptical lesion dries out to a light grey, with the bases of the old fructifications showing up as scattered black dots. Under laboratory conditions there was evidence that the spores have not a long period of viability.

The paper terminates with a brief description of two other diseases of the banana leaves observed in Queensland, which on occasions may be responsible for as much loss as leaf spot, and which have been sometimes confused with the latter. The first (termed leaf speckle) is found on the lower leaves usually in the more shaded or crowded situations, and develops on the under surface of the leaves in the form of light grey patches composed of a close speckling of the surface with greyish dots, which, later,

darken and coalesce, and the leaf surface becomes speckled with scattered or aggregated dark brown to black blotches of varying size and intensity, ending in the death of the portions involved. Under favourable conditions, speckle gradually spreads from the lower leaves upwards. It assumes serious proportions earlier in the season than leaf spot, but a rapid epidemic outbreak, such as occurs sometimes with the latter, is not a feature of this disease. Isolations from the lesions fairly consistently yielded an organism, certain strains of which showed cultural characters resembling those of *C. musae*; so far, however, no definite fructifications have been obtained, and the organism has not been identified. A condition resembling speckle was collected by the author from bananas in Ceylon, and appeared to be similar to specimens in the herbarium in Peradeniya, labelled *Leptosphaeria musarum*.

The second leaf disease (termed yellow leaf spot) has only been observed so far in two districts of north Queensland. It first appears in the lower leaves as somewhat indefinite light yellow areas which gradually enlarge to an elongate-elliptical or, more characteristically, a diamond shape. These spots turn deep yellow and then gradually darken in the centre and dry out to dark brown, leaving a narrow yellow margin. The mature spots may be 3 to 4 inches long by 1 to 1·5 inches broad. The disease has essentially the same effect on the plant as leaf spot, but is not quite as serious, except under certain conditions. Associated with this spot is a species of *Scolecotrichum* closely resembling, and considered to be probably identical with, *S. musae* Zimm. [ibid., iii, p. 103].

WILSON (E. E.). **Development and control of Olive knot.**—Abs. in *Phytopath.*, xxiii, 1, p. 37, 1933.

Olive knot [*Pseudomonas savastanoi*: *R.A.M.*, vii, pp. 491, 725; viii, p. 547] is stated to have assumed a serious form in the northern part of the Sacramento Valley [California] within the last four years, affecting chiefly the smaller branches but also the trunks, limbs, leaves, and occasionally the fruits. In certain orchards 95 per cent. of the knots develop at leaf or blossom scars. Inoculation experiments showed that, although infection may occur in December and January, the knots may not appear until March or April. On the other hand, inoculations made in March or April resulted in knot development within a few weeks. Under natural conditions the majority of knots appear in the spring and early summer. Some prospect of control is afforded by three applications of home-made Bordeaux mixture.

GIGANTE. (R.). **Ricerche preliminari sopra un'alterazione non parassitaria delle Olive.** [Preliminary investigation of a non-parasitic disturbance of Olives.]—*Rendic. R. Accad. Lincei*, xvii, Ser. VI, 1, pp. 99–103, 1933.

In this note the author gives an account of his attempt to determine the etiology of a fruit spot of olives which is stated to have been very prevalent in 1932 in the province of Rome, and which in some respects resembled hail injury. The lesion was shown to originate in the mesocarp, certain cells of which undergo lysis for

some unknown reason; as the lytic process extends, rounded or elliptical spots appear on the surface, at first brownish-green but later dark and necrotic, and may attain from 1 to 4 mm. (occasionally up to 6 mm.) in diameter. At an advanced stage the lesion frequently opens up and may reach as far as the stone, when it becomes invaded by secondary organisms, but all isolations before this stage remained sterile. Although the disturbance could not be reproduced under controlled conditions, the fact that the closest approach to it was obtained when olives were subjected to the action of certain vapours, e.g., turpentine, ammonia, and the like, suggests that the trouble may be caused by the presence of some deleterious substance in the atmosphere or in the precipitation water.

ZSCHOKKE (A.). **Unfallverhütung bei der Verwendung von Hochdruckspritzen zur Bekämpfung der Obstbaumschädlinge.** [Prevention of accidents in the use of high pressure spraying apparatus for the control of fruit tree pests.]—*Obst- und Gemüsebau*, lxxix, 2, pp. 27–28, 1933.

Attention is drawn to the risk of accidents to men employed in the manipulation of the high pressure (up to 25 atmospheres) spraying apparatus now in common use in Germany for the control of orchard and vineyard pests. So disquieting had the situation in the Palatinate become in this respect that an inspection of the 2,800 apparatus used in the vineyards was recently ordered, with the result that 135 (6 per cent.) failed to withstand the pressure placed upon them. The machines supplied by one of the firms represented in the inspection were defective to the extent of 13 per cent. Some simple but reliable measures for testing the safety of the apparatus and for the preservation of the latter in good condition are indicated.

WILSON (J. D.) & RUNNELS (H. A.). **Influence of spray materials on transpiration.**—Abs. in *Phytopath.*, xxiii, 1, p. 37, 1933.

Bordeaux mixture checked growth, reduced yield, and increased transpiration and blossom-end rot of tomatoes [*R.A.M.*, viii, p. 426; xi, p. 698], none of which results followed the application of an oil spray [cf. ibid., x, p. 807]. Experimental data indicate that transpiration is accelerated by Bordeaux mixture more during the night than in the daytime. The increases in transpiration caused by some other copper sprays are not comparable with those produced by Bordeaux mixture. If the amount of copper in a given volume of the mixture is kept constant, each additional increment of lime accentuates the influence of the mixture on the transpiration rate until the quantity of lime exceeds that of copper by 1½ times. Bordeaux mixtures prepared with high magnesium and high calcium limes [ibid., xii, p. 391] are equally active in increasing transpiration. This effect does not so readily follow the application of a mixture of hydrated lime and water as of Bordeaux mixture containing an equivalent amount of lime. Mixtures in which the particles remain well in suspension are more active in increasing transpiration than those that settle quickly. Certain other

sulphates in combination with lime enhance transpiration similarly to copper sulphate.

STORCK. **Erd-Dämpfung zur Bodendesinfektion.** [Soil steaming for ground disinfection.]—*Blumen- und Pflanzenbau*, xlviii, 2, pp. 21–23, 3 figs., 1933.

Details are given of the construction and application of the 'Alfa' steamer for soil sterilization (Alfa-Laval-Separator, G.m.b.H., Döberitzerstr. 2, Berlin N.W. 40). By means of this apparatus (No. 120), 400 to 500 l. of soil can be steamed in a working day, steam generation taking place 25 to 30 minutes after firing and continuing for 60 to 70 minutes. The steamer holds 550 10 cm. pots of which 3,000 to 6,000 can be treated in a day. The soil is heated during the process to a temperature of 64° to 98° C., the former near the centre and the latter at the outer edge. The present cost of the steamer is M. 180.

LIMING (O. N.). **The preparation and properties of pentathionic acid and its salts; its toxicity to fungi, bacteria, and insects.**—*Phytopath.*, xxiii, 2, pp. 155–174, 1 diag., 1933.

Sodium, barium, and potassium pentathionates were prepared from concentrated acid formed by the action of hydrochloric acid on sodium thiosulphate [*R.A.M.*, xi, p. 465]. These salts are stable when thoroughly dried and kept at room temperature, but they break down in the presence of moisture and form, among other products, sulphur and sulphur dioxide. On standing, a concentrated solution of pentathionic acid slowly decomposed, forming free sulphur and sulphur dioxide, whereas dilute solutions showed only slight traces of decomposition after six months.

A suspension of hydrophilic colloidal sulphur, prepared by the sulphur dioxide-hydrogen sulphide method [ibid., ii, p. 462], was found, on reduction to a paste, to contain about 47 per cent. free sulphur, 34 per cent. pentathionic acid, and 19 per cent. water. On exposure to the air, sulphur dioxide was formed.

Pentathionic acid was shown to be toxic, in varying degrees, to nine pathogenic fungi, three bacterial pathogens, three species of plant lice, and earthworms. At 0·0068 N the germination of seven of the fungi was completely inhibited, and that of one of the others reduced to 3·3 per cent. Sulphuric acid (0·0068 N) did not appreciably inhibit the growth of these fungi and in the tests on bacteria pentathionic acid was from two to six times more toxic than sulphuric acid.

A few details are given of preliminary tests of the colloidal sulphur as a fungicide, the results of which are regarded as being promising.

HENDEE (ESTHER C.). **The association of termites with fungi.**—*Science*, N.S., lxxvii, 1991, pp. 212–213, 1933.

Representatives of 33 genera as well as 20 undetermined fungi were isolated in California from colonies of three species of termites, *Kalotermes minor*, *Reticulitermes hesperus*, and *Zoötermopsis angusticollis*, some from the exterior of the body and others from their faecal pellets, 'frass', and the wood enclosing their burrows.

*Penicillium* and *Trichoderma* were the genera most frequently encountered, but no evidence was forthcoming of a specific relation between a given fungus and any species of the insects. Termites placed on pure cultures of a fungus were found capable of transporting large masses of spores and hyphae on their legs and bodies, and subsequent dissection revealed these elements in the gut. It was further shown by experiments that the insects may introduce new fungi into wood and also assist in the spread of those already present [cf. *R.A.M.*, ix, p. 279].

DUGGAR (B. M.) & HOLLAENDER (A.). **Ultra-violet radiation.**—Abs. in *Science*, N.S., lxxvii, 1988 (Supplement), p. 26, 1933.

At Wisconsin University the tobacco mosaic virus and cultures of three kinds of bacteria were exposed to the action of ultra-violet rays of a certain narrow range of wave-lengths. The virus was found to resist radiation up to 150 times the amount sufficient to kill one of the bacterial species.

KLAPP (E.) & SPENNEMANN. **Ökologie und Abbau der Kartoffel.** [Ecology and Potato degeneration.]—*Pflanzenbau, Pflanzenschutz u. Pflanzenzucht*, ix, 8, pp. 303–313, 5 maps, 1933.

In connexion with a study of the ecological factors influencing potato degeneration, three separate regions of Germany were investigated from this standpoint [*R.A.M.*, xi, p. 531]. The first shows no tendency to induce degeneration, which occurs to a variable extent in the second and is prevalent in the third. The climate in region No. 1 (average altitude 450 m. above sea level) is mountainous and in No. 3 (170 m.) continental, the soils of the former being fairly heavy ('podsol') and those of the latter soft clay, often with an upper layer of loess or black earth. The conditions in region No. 2 are intermediate between the two extremes. The flora of region No. 1 consists largely of mountain, subatlantic, northern species with many heath plants, and that of No. 3 mainly of continental types with an admixture of introductions from southern Europe.

RICHARDS (B. L.) & BLOOD (H. L.). **Psyllid yellows of the Potato.**—*Journ. Agric. Res.*, xlvi, 3, pp. 189–216, 7 figs., 1933.

This is a detailed account of the authors' investigation up to date of the yellows disease induced in potatoes by the nymphs of the psyllid *Paratrioza cockerelli* [see above, p. 424]. In addition to the information already noticed from previous communications, it is stated that the condition is particularly prevalent in the Washington County of southern Utah, and also in the early potato-growing areas of Davis and Weber Counties of that State; a similar condition has also been reported from the Fruita section in the Grand Junction (western slope) district of Colorado. The disease may develop suddenly in any one season over a vast area, and is capable of extensive and frequently complete destruction of both the early and late crops of potato. Observations indicate that the rate of dissemination of the disease is closely related to the size, motility, fecundity, longevity, and long oviposition period of the females of the psyllid, as well as to the apparent general

distribution of the insect. Preliminary tests showed that hatching the psyllid nymphs on healthy potato leaves in Petri dishes did not reduce their infectivity, but rather increased it, as indicated by the more vigorous symptoms induced by the nymphs so reared on healthy Irish Cobblers, in comparison to the symptoms produced by nymphs of the same age that had been fed on infected potato plants.

While the true nature of the infective principle carried by the nymphs is still unknown, the evidence so far collected would appear to militate against the virus theory of the disease, and would rather suggest the possible existence of some toxic substance which is produced in some way during the feeding process of the psyllid nymphs.

SANFORD (G. B.). **On treating seed Potatoes for the control of common scab.**—*Scient. Agric.*, xiii, 6, pp. 364–373, 2 pl., 1933. [French summary on p. 409.]

As a result of his field and laboratory experiments [details of which are given], the author states that none of the standard potato seed tuber treatments commonly recommended for the control of common scab (*Actinomyces scabies*) which were tested by him, namely, steeping the tubers in hot or cold formaldehyde, mercuric chloride, or Bayer No. 649, was effective in appreciably reducing the disease in the ensuing crops, while the planting of untreated scabby tubers did not increase the amount of scab in the new crop. A slight increase resulted when, prior to planting, the seed tubers were coated with a virulent culture of *A. scabies*, and then only on the new tubers which developed in close proximity to the old inoculated mother tuber. When tubers were set in a soil culture of the parasite, only that part of the tubers which grew in the inoculated soil area was scabbed. It was further shown that in sterilized soil of optimum moisture content *A. scabies* grew vigorously when practically in contact with pieces of potatoes treated as above or coated with sulphur, semesan bel, or Bayer No. 649 dusts.

These results lead the author to consider that the methods now recommended for surface treatment of the seed tubers are of no practical value under ordinary field conditions, where the amount of scab on the new crop appears to depend wholly on the natural infestation of the soil. Further, the fact that under controlled conditions the growth into the surrounding soil of the pathogen, whether it developed from the scabs or from spores on the surface of the tubers, was very definitely restricted to a small area and did not spread far of itself (never more than 2 mm. in three months), raises the question whether the amount of *A. scabies* in the soil is increased by the planting of scabby, untreated potato tubers beyond the increase which normally occurs in nature.

POOLE (R. F.). **Effects of formaldehyde on Ceratostomella fimbriata and the Sweetpotato.**—*Journ. Agric. Res.*, xlvi, 3, pp. 281–290, 4 figs., 1933.

The results of the experiments described in this paper showed that formaldehyde is not a suitable tuber disinfectant for the

control of black rot (*Ceratostomella fimbriata*) of sweet potatoes [*R.A.M.*, xi, p. 535]. Even the weakest concentrations of formaldehyde (1 in 300) tested, quite insufficient to kill the spores of the fungus, caused a definite breakdown of the sweet potato tubers and rendered them very susceptible to attacks of secondary fungi and other organisms which frequently destroyed the tubers or suppressed their germination.

CROSS (W. E.). **Notas sobre la cultura agronómica de Tucumán en su régimen y desenvolvimiento en los últimos cincuenta años.** [Notes on the agriculture of Tucumán and its management and development in the last fifty years.]—*Estac. Exper. Agric. de Tucumán Bol.* 20, 56 pp., 15 figs., 1932.

The following references of phytopathological interest occur on pp. 22–3 of this bulletin. During the early part of the 50-year period under review, the sugar-cane crops of Tucumán suffered severe damage from 'polvillo' [lit. 'fine dust': cf. *R.A.M.*, xi, p. 269] or heart rot, which was especially virulent in 1895. It was investigated by Spegazzini shortly afterwards. This disease later declined in intensity, but remained for long an enemy to the cultivation of the susceptible Criollo cane. At the beginning of the present century, mosaic began to cause progressively heavy losses, which reached a climax during 1915–16 but have gradually diminished to negligible proportions since the introduction in 1917 of the resistant P.O.J. 36 and 213 varieties [cf. ibid., vii, p. 400; xi, p. 128].

**Importation of plants regulations. Government Notice 462.**—*Southern Rhodesia Government Gaz.*, 5th Aug., 1932.

The following additional information is given regarding the Southern Rhodesia Importation of Plants Regulations published in Government Notice No. 462 of 5th August, 1932 [cf. *R.A.M.*, xii, p. 399], as regards importations from countries not in the Plant Interchange Schedule. Permits for citrus trees are only to be granted for special varieties not procurable in Southern Rhodesia, and all consignments must be accompanied by an official certificate vouching for their freedom from pests and diseases, particularly canker (*Pseudomonas citri*) which must not have been known at any time within 100 miles of the place of origin. Imported trees are to be kept in quarantine for at least three years.

Tea plant and seed consignments must be accompanied by a certificate guaranteeing the absence of blister blight (*Exobasidium vexans*) from within 10 miles of the area of production.

Maize consignments must not exceed 10 lb. in weight and must be officially certified to originate in districts free from the *Sclerospora* diseases.

Consignments of pome fruit trees, including ornamental species of *Cydonia*, *Pyrus*, and *Malus*, must be certified as originating in premises free from fireblight (*Bacillus amylovorus*).

Cotton seed may only be imported under special justifying circumstances, and permits will be limited to 4 oz. of each variety.

Potato consignments must be accompanied by a certificate to the effect that wart disease (*Synchytrium endobioticum*) does not exist within five miles of their place of cultivation.

All other plants or plant products except fruit, bulbs, tubers, garden vegetables, seeds, and such portions of plants as cannot be propagated shall be allowed only under special permit from the Department of Agriculture. This restriction shall not apply to nursery stock grown in a registered nursery in any of the States in the Plant Interchange Schedule, provided the nurseryman holds a permit from the Department for the introduction of his stock into Southern Rhodesia. The conditions under which these nursery permits will be granted are specified.

Provision is made for the inspection and treatment, if necessary, of all plant imports (including seed) on arrival in the country, and for the destruction without compensation of any deemed dangerous.

**United States Department of Agriculture. Bureau of Plant Quarantine. Seed or Paddy Rice Quarantine No. 55. Revision of quarantine and regulations.**—3 pp., 1933.

In order to prevent the introduction into the United States of certain injurious fungous diseases of rice, including downy mildew (*Sclerospora macrocarpa*), leaf smut (*Entyloma oryzae*), blight (*Oospora oryzetorum*), and glume blotch (*Melanomma glumarum*), the present revision, effective 1st July, 1933, of Quarantine No. 55 [*R.A.M.*, iii, p. 176] (which is hereby superseded) prohibits the importation into the United States from any foreign country (except Mexico, to which special regulations apply) of seed or paddy rice, rice straw, and rice hulls.

**United States Department of Agriculture. Bureau of Plant Quarantine. Packing materials quarantine. Notice of Quarantine No. 69 with regulations.**—3 pp., 1933.

Quarantine No. 69, effective as from 1st July, 1933, prohibits the use for packing purposes of rice straw and rice hulls from all countries on account of the risk of introducing into the United States some of the numerous diseases and pests affecting this crop abroad [see preceding abstract]. Of the other plant substances used for packing prohibited by this quarantine, some are of negligible importance and others are already covered by existing quarantines but are included for convenience. Forest litter, and soil containing an appreciable admixture of vegetable matter, from all countries are also prohibited, except certain types of soil, and peat, peat moss, and *Osmunda* fibre which are considered to be safe. A list is also given of materials that may be used for packing under certain restrictions involving chiefly the right of departmental inspection and of eventual treatment in the interests of safety.